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SALE OF POWER BY RAILWAYS

All of the papers at the Cedar Point convention of the Central Electric Railway Association this week are of a high order and will well repay study. That by Mr. Milligan, of the Western Ohio Railroad, is particularly valuable as an encouragement to those railways which are seeking to develop a commercial power business along their rights-of-way. One of the early arguments in favor of electric railway lines was the facility with which the operating companies could distribute power to miscellaneous users of it, but with the development of the 25-cycle high-tension system of power distribution the practical difficulties of converting such energy in small quantities have seemed unsurmountable. These conditions have changed, according to Mr. Milligan, and the success of his property in the sale of energy for miscellaneous purposes is so well recognized as to offer encouragement to others. If these methods were more common, there would be less opposition to the construction of high-tension lines through the country. They are not an object of beauty to the average country resident, and if he derives no benefit from them, they are considered somewhat in the light of an eyesore, or even as a nuisance. But if energy from them can be used to supply light and power in small quantities to the hamlets along the line and even to individual residences, then they become part of a service from which he can profit, and hence they assume a different aspect. The possibilities in this direction are unlimited. For miscellaneous farming purposes electric power can be used to a considerable extent, and the paper in question describes also how current suitable for arc and incandescent lighting can readily and cheaply be obtained from 25-cycle high-tension lines. Finally, the ability to furnish power for small factory use should encourage the construction of manufacturing plants along the line of the road, and thus, metaphorically speaking, enable the railway company to kill two birds with one stone.

THE VALUE OF WELFARE WORK

Undoubtedly the advance of welfare work among public utility companies has received a setback during the past week through the developments on the Boston Elevated Railway. Here was a case of a company which had been most liberal in its consideration of the welfare of its employees. It was one of the first to establish a pension system, had supported two mutual aid associations, had given free legal advice to the men, had made donations to individual employees for meritorious acts and loans to many of the unfortunate among its men, had paid great attention to the comfortable and sanitary condition of its depots, and in many other ways and at great expense it had endeavored to carry out the most advanced ideas in welfare work. Finally it had raised wages four times during the past ten years, the last raise providing for ten hours' pay for nine hours' work and a higher rate for overtime. With these increases the highest wage which a man could receive was 30 per cent more than was possible in 1902. Yet last week all these considerations were thrown over at prac-

tically a moment's notice by a considerable portion of the company's employees as not being worthy of consideration, and the company's service was disorganized and its property attacked and destroyed for the sole purpose that a union inimicable to the management should control the employees. Such a situation, we say, will raise serious doubt in the minds of a great many thinking people as to whether a policy of liberality and conciliation such as that followed by the Boston Elevated Railway pays. Undoubtedly the enlightened plan pursued in the past appealed to a considerable proportion of the employees, especially to the older men and those with families. But are most of the motormen and conductors of a large railway system, taken as a whole, broad enough and intelligent enough to appreciate such a system, and is their intention to remain in the service sufficiently settled so that treatment of this kind and provision for sick benefits and old-age pensions will appeal to them as against the wild harangues of agitators? We do not despair of the ultimate good of welfare work. At the same time we do believe that the experience in Boston will cause a great many thoughtful managers to pause and doubt.

CALCULATION OF PROBABLE TRAFFIC

The paper read before the Central Electric Railway Association this week by A. J. Boardman, superintendent Terre Haute, Indianapolis & Eastern Traction Company, upon the relation between the population served and the number of passengers carried upon an interurban line in Indiana presents very interesting data. The effort to deduce some general relation between the population of a district and the interurban railway traffic which should be obtained in such a district might be said to have taken almost as much time as that expended to square the circle or to produce the philosopher's stone. By this we do not mean that there is no solution to the problem. We think that there is. But before undertaking it we must decide upon the proper method of determining the population of the district served, and here is the main difficulty. With city railways the problem is a simple one. The figure wanted can be obtained directly from the census report. But with interurban roads there are about as many varieties of methods of calculating population as there are of pickles. All investigators agree that where the interurban road has one large city terminal its population should be largely ignored. Some calculators exclude this population altogether; others consider it only up to 50,000 or some other arbitrary figure, while still others give to it a value which decreases very rapidly with the size of the city. The same difference of opinion exists as to the extent to which the number of people served should include the population of the smaller city which is usually the other terminal of the line. Ideas are equally divided as to the proper method of calculating intermediate population. One group believes that all people should be included who reside on a strip 2 miles in width with the railway as a center. This group might be called the peripatetic school of philosophers because it believes in an individual count of the houses along the line. A second school assumes for the inter-town inhabitants the proportion of the whole township population which the area of a strip 2 miles wide across the township would represent, as compared with the total area of the township, while a third boldly rejects all population except that in the towns and villages on the line. One reason for this difference in practice has undoubtedly been that there has been a lack of published data as to the traffic originating on different divisions of the principal interurban lines in the Central West, where the interurban lines have reached their greatest development. It is this lack of data which Mr. Boardman's paper in part supplies, and his investigations and report upon the traffic situation of the Terre Haute, Indianapolis & Eastern Traction Company are especially welcome for this reason.

THE RIGHTS OF TRANSMISSION LINES

In our last issue was reported an extremely important case before the Public Service Commission of Ohio involving some of the fundamental rights of transmission companies on their own rights-of-way, and in this issue the subject is reviewed in a paper by Mr. Swain before the Central Electric Railway Association. The issue raised in the case before us is vital to the progress of electrical transmission in that it involves the utilization of private rights-of-way, which have hitherto escaped most of the litigation which has been raised in the matter of electrical power transmission. The matter in dispute concerns a transmission line of the Cleveland, Painesville & Eastern Railroad Company and the Western Union Telegraph Company, the former on its own right-of-way and the latter on the contiguous right-of-way of the Lake Shore & Michigan Southern Railroad. The transmission line is built in conformity to the requirements of the American Electric Railway Association specifications for high-tension lines. It is on wooden poles nearly 40 ft. above ground, on the average, and spaced 120 ft. apart. The wires are carried on a single 6-ft. arm and are of No. 3 hard-drawn copper, supported on steel pin insulators.

The Western Union Company, which has a pole line parallel to this transmission circuit for about 7 miles, complains bitterly of the possible dangers in case the transmission line should fall upon its circuits. These Western Union circuits are on 25-ft. poles equipped with five 10-ft. cross-arms and carrying thirty or more wires on a 150-ft. span. At one point for about ten spans the nearest wires of the telegraph line come within less than 6 ft., horizontal distance, from the high-tension wires and at a similar distance below them. And for many more spans the horizontal distance is not over 8 ft. or 10 ft.

The complaint filed by the telegraph company alleges that the high-tension line is dangerous on account of liability of wires from storm or other cause to fall upon the telegraph circuit, and demands that the transmission line be moved from its present right-of-way to at least a pole length from the telegraph lines. In reply the railway company alleges that the complaint is not in good faith, its real purpose being to force the transmission wires away from its own in order to avoid induction, the complaint of public danger being merely a subterfuge. The railway further retorts that lines of practically the same construction have been used by it for eight years with no trouble from storms or mechanical failures of any kind, that the transmission line as built is entirely sound and safe, and that the contingencies conjured up by the telegraph company which

might lead to failure are without reasonable foundation. Numerous witnesses have been called by each side and have furnished, as is usual in such cases, a large mass of utterly contradictory testimony.

The question at issue is a serious one, especially with respect to railway transmissions, which usually run through well-settled country where rights-of-way are expensive. By far the easiest and cheapest right-of-way for such purposes is that to be obtained along the lines of existing railways, and if transmission lines are to be driven away from these to a distance of 50 ft. or 75 ft. the cost of the necessary rights for transmission lines would be very much increased. Further, the case involves the sufficiency of the present standard specification for such transmission lines. If it is adequate, the contentions of the telegraph company are obviously without weight, even though the lines are exceptionally close together. It should be noted in addition that in the stretch where the lines are nearest together the evidence shows the circuits of the telegraph company to be clearly off their own right-of-way. In other words, where the danger is greatest the telegraph company appears to be plainly a trespasser owing to its poles leaning outward and to the use of extremely long cross-arms.

Looking over the evidence, it seems to us that the hypothetical sources of danger dragged into the case by the telegraph company are for the most part so far-fetched as to be ridiculous. For instance, it was suggested that the wind might blow the top of a box car of a passing train into the transmission line and break down the wires, that the train might jump the track and knock down the transmission-line poles, in spite of the fact that these are well outside the telegraph poles, that the transmission wires might be swayed by wind into contact with the telegraph wires, and so on at considerable length. None of the witnesses for the telegraph company was able to cite any instance of a transmission circuit located similarly with respect to a telegraph circuit having failed and interfered with the latter. The few cases of contact between high-tension and low-tension circuits which could be found seem to be irrelevant. In point of fact a break-down from storms or sleet of a transmission line built as soundly as is this is a very unusual occurrence. It is a question, indeed, whether any instance can be cited of a line built on practically these standard specifications having failed or been carried down from any cause due to the weather. The lines which go down in storms are mostly telegraph lines with weak, rotten and ill-set poles, overloaded with a tangle of weak iron wires. Any big storm will show the telegraph circuits reduced to a broken snarl, while power transmission circuits in the same locality will be found standing up quite unharmed. It has been the universal experience of transmission companies that mechanical failure of a main transmission line for any cause is a contingency so rare as to be practically negligible, and when there is trouble it is found on distribution circuits.

As to electrical accidents, it is perfectly true that a line will now and then come down from arcing, but when falling from a position like that shown to exist in this case the danger of a falling wire to the telegraph circuit would be practically non-existent. A broken wire would drop clear, even with the short distance of separation found at certain points in this case. In fact, if the telegraph line was kept rigorously over its right-of-way, its distance from the transmission wires would be so increased that a falling wire would inevitably go harmlessly to earth. Taking the experience throughout the country as a guide, one may safely say that high-tension transmission circuits are more secure than any other class of electrical circuits. It is all-important for continuity of service that they should be well erected and kept under thorough inspection. It ill becomes the owners of rickety and overloaded telegraph lines to howl about the dangers to the public contingent on the breaking down of transmission circuits. One can imagine a concatenation of accidents which might cause almost any conceivable event, but the effort would strain the powers of the imagination. For instance, a runaway aeroplane might dive into that bunch of telegraph wires, break them, and lift them high enough to throw them over the transmission circuits, or the dragging anchor of a balloon might serve the same purpose. A locomotive boiler might explode and blow both lines into a tangled heap, or a cyclone might deposit a barn upon them or blow a few rods of barbed-wire fence across both lines. These, however, must not be considered reasonable contingencies against which the public requires to be guarded by drastic regulation on the part of the public service commission.

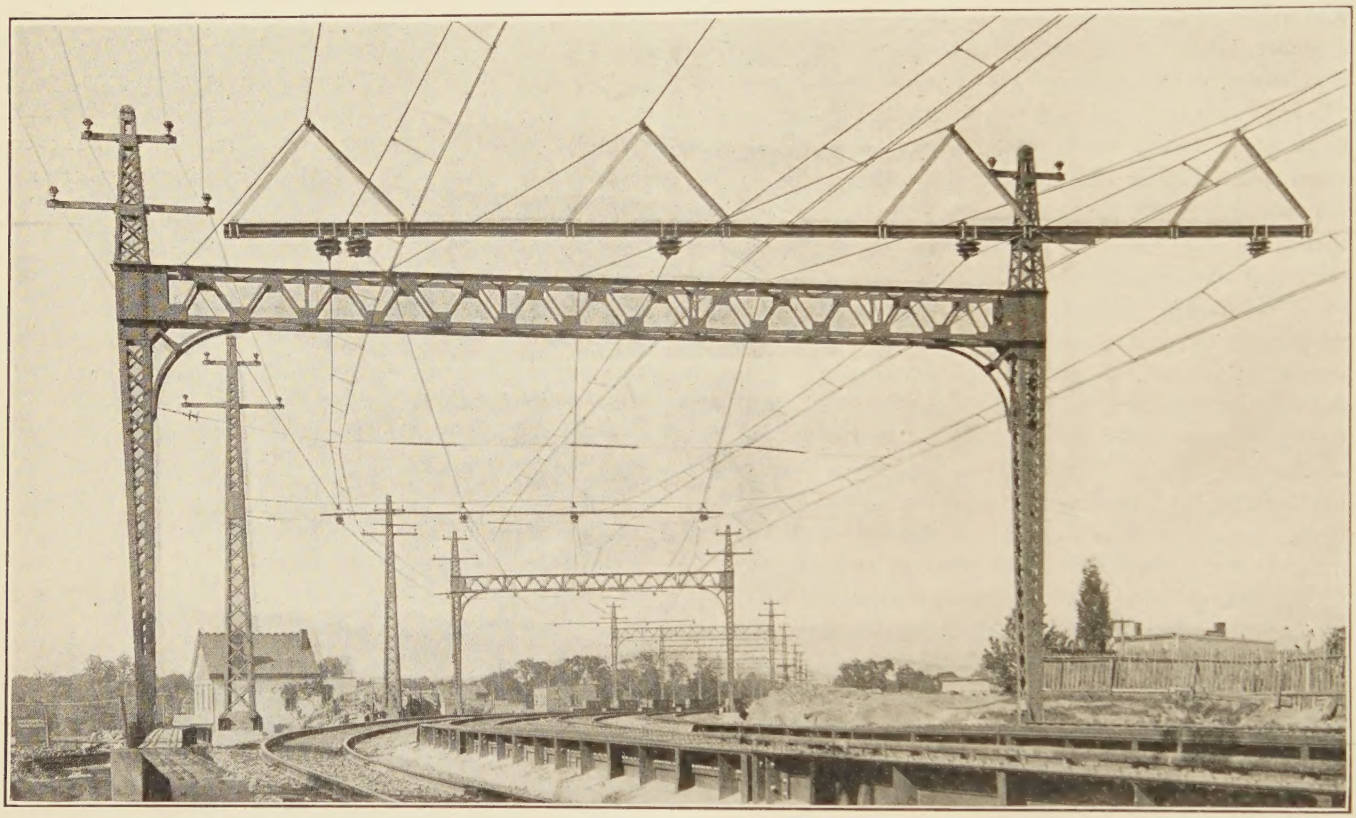
Looking at the matter quite seriously, it seems to us that the telegraph company is protesting with very bad grace until it has rebuilt its lines so as to keep its wires on the territory to which it has a legal right. Further, it should not rely on remote conjecture as a basis for a claim of imminent danger to the public. Thirdly, it should make its own line sound, if only for the sake of public service, before it complains about other people's lines. Telegraphic communication is about the first thing to go down and out in a storm. Anybody who will take the trouble to note the condition of the telegraph lines as he rides along almost any railway will not have to be told the reason why.

As respects the transmission line in question, we have only one criticism to make, and that is that a solid No. 6 grounded wire is open to objection on account of the chance for corrosion alongside a railroad track. A stranded galvanized cable seems to us to offer a greater degree of security. In fact, since this wire is the only one of the transmission group which could by any reasonable possibility in breaking be so deflected as to cross the telegraph wires, we should be inclined to omit it entirely along the comparatively short distance of nearest approach to the telegraph wires. It would further not be difficult to guy the transmission poles so as to double their already large factor of safety and to slack off the conductors and lower the cross-arms sufficiently to remove absolutely even the wildest hypothetical chance of a falling transmission wire crossing the other system. For all practical purposes the line, well constructed as it is, appears to be safe from such dangers now, but it would not be difficult to increase its factor of safety in every direction without changing its location. If the telegraph company would not be satisfied with such a solution, one is certainly justified in holding that its ostensible reasons for objection are not the real ones, in which case we fancy that the Ohio commission will not assume the attitude of encouraging hypocrisy.

Energy Distribution on the New York, Westchester & Boston Railway

A Description of the Overhead Line Construction on the Latest Single-Phase Electrification—Wiring and Supporting Structures Are of the Latest Approved Design—One Section Is Equipped with a New Type of Catenary

The New York, Westchester & Boston Railway, as described in the Electric Railway Journal for May 25 and June 8, is unique in being the only strictly suburban electric railway in the country which has not been built up from an older road as a basis. The project consisted in building a high-speed road for 21 miles through practically virgin territory which when given adequate transportation facilities was certain to provide a heavy traffic. In consequence, the builders were unhampered by the necessity of following any definite collection of standards and were in position to select for use only the best features which exist in the practice of the present day.



New York, Westchester & Boston—Compound Catenary Construction on a Four-Track Curve

It was, of course, axiomatic that electricity should be used as a motive power. However, the determination of the most desirable system of electric traction was a problem of considerable magnitude into which so many variable factors entered that its solution was impossible except in its application to the individual case. The use of direct current furnished through substations is universal with the transportation systems of New York City, and several of these will eventually make practically physical connection with the new railway. On the other hand, however, a very substantial precedent for the use of single-phase alternating current existed in the successful installation of that system on the New York, New Haven & Hartford Railroad.

When all the relevant factors were considered, the alternating-current system appeared to be more desirable, and this decision enabled the new railway to take advantage of the extended experience of the New York, New Haven & Hartford Railroad with that system. In fact, the latter company has carried out the electrification of the new railway and has been represented by P. J. Kearny, the engineer in charge of electric traction, in the design and installation of the power circuits of the new railway. The benefit of this experience has been shown by the fact that, notwithstanding the brand-new condition of the entire line, not a single delay or accident has occurred since power was turned on. In general the overhead construction is quite similar to that now being installed on the Harlem branch of the New York, New Haven & Hartford Railroad. However, on the New Rochelle branch of the new line a trial installation differing from the standard form of construction has been installed.

POWER REQUIREMENTS

Since the road is constructed through practically unsettled territory, the requirements for some years to come will be very much less than the estimated ultimate schedule. The latter is expected to be approximately six and one-half times the initial schedule, or 11,700,000 car miles per annum against a present condition of 1,772,000 car miles. The power requirements were established by means of a load curve based on the operating schedule and which is shown in the cut on page 1011. This gives the hourly loads existing during an average day under winter conditions. As shown by these curves, the maximum demand for current under the ultimate schedule amounts to 17,200 kw, which, however, will not last over a full hour, so that the average hourly demand amounts to 16,600 kw. The average hourly demands, both for the ultimate and the present schedules, are shown by the dotted lines at the peaks of the curves.

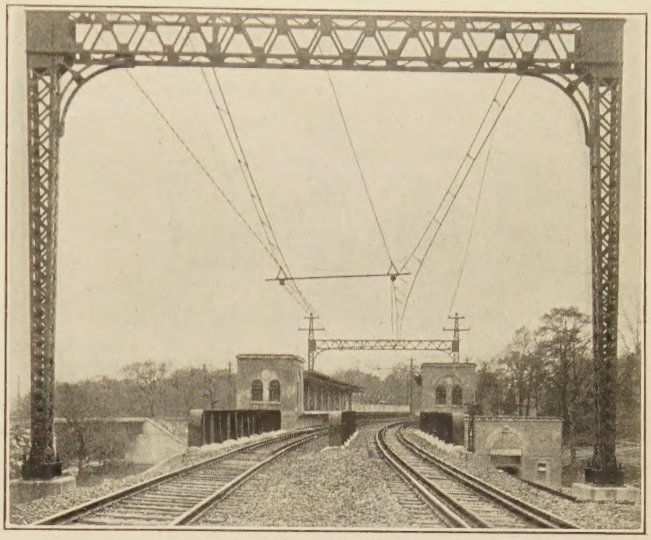
At present the equipment consists of thirty cars, of which six are held in reserve so that the average annual mileage of each car is estimated at 61,500 miles. The requirements of the ultimate schedule will be approximately 150 cars. The cars, which were described in the ELECTRIC RAILWAY JOURNAL of March 30, 1912, collect current from the overhead wires through a pantograph and step the line voltage of 11,000 volts down to approximately 250 volts at the motors. The weight of each car fully equipped is 119,000 lb. The motors are of the single-phase type and have an hourly rating of 175 hp. Two are installed on each car and are operated by indirect control.

Power is received from the Cos Cob power station of the New York, New Haven & Hartford Railway and is purchased from that company at a flat rate. The connection is made at the end of the New Rochelle branch, where it approaches the main line of the New Haven. This point is 16 miles away from the generating station, and, notwithstanding the fact that the power is delivered through four No. 0000 feeders which are also to be used for the Harlem branch of the New Haven railroad, the calculated transmission loss is only 3 per cent. This is a striking example of the advantages of the high-tension single-phase system. In this connection it is planned to convert the present arrangement into a 22,000-volt, three-wire system whenever this contemplated change is made on the main line of the New Haven.

The line voltage is maintained exactly at 11,000 volts by means of a Tirrill regulator at the power station which controls that leg of the three-phase generator supplying the line. The two other legs of the generator cannot be regulated owing to the variable field required on the active leg. These windings are, however, used to supply three-phase current for operating elevator motors, pumping water and similar purposes, and an additional wire to complete this auxiliary three-phase supply is carried along the line.

FEEDERS AND BONDS

At New Rochelle four No. 0000 branches are taken from the main line feeders of the New York, New Haven & Hartford Railroad and carried along the tracks on the catenary bridges to Columbus Avenue. At this junction point two of the No. 0000 feeders are carried south along the four-track section of the railway to the New York end and two others are carried north along the two-track branch to White Plains. Circuit breakers are located between these feeders and the overhead lines at New Rochelle and Columbus Avenue and also at intermediate points approximately in the centers of both the four-track section and the White Plains branch. These circuit breakers do not operate on ordinary overloads, as the experience of the New Haven road has established the fact that it is undesirable to have them do so. There is extended along the line a control wire which is connected with the overload relays at the power house switch house. Unless this control wire is energized by these relays none of the line circuit breakers can open. The overload relays at the power house switch house automatically throw resistance into the circuit prior to opening, so that the current involved by a short circuit is greatly reduced and, on this account, a short circuit on the line, owing to the control wire, does not cause the opening of any of the line circuit breakers except the two immediately affected by the fault.

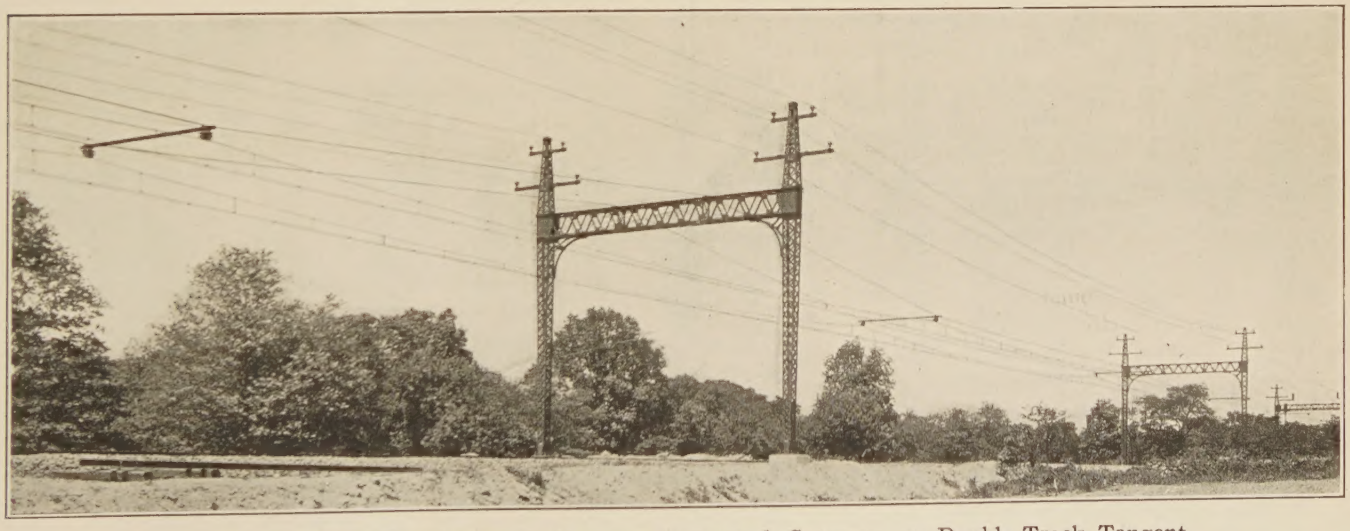


New York, Westchester & Boston—Compound Catenary at Double-Track Curve

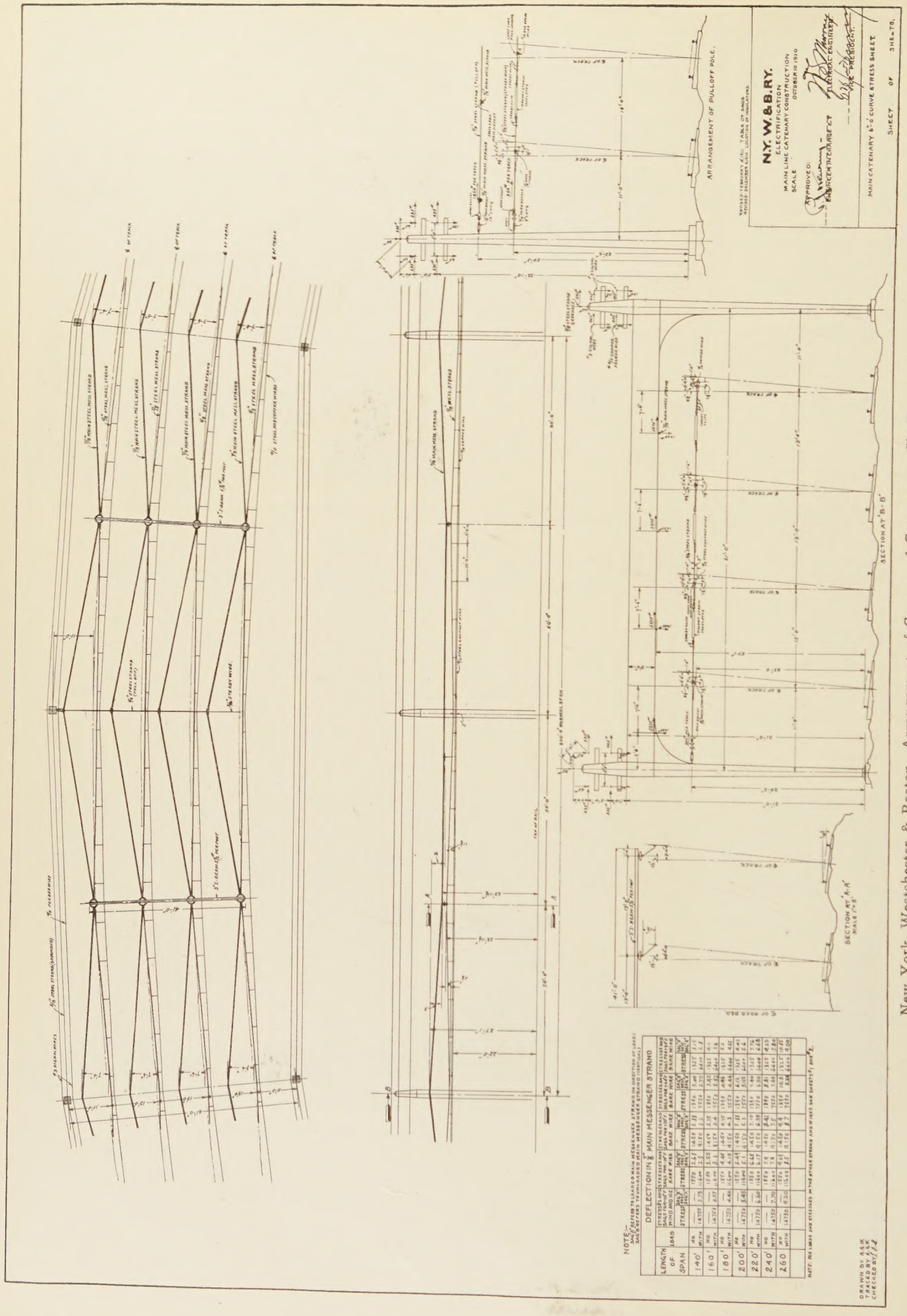
Line circuit breakers are in every case located on overhead anchor bridges. The feeders are also divided into sections by circuit breakers, the sections being cross connected at the ends by a bus wire which extends across each anchor bridge. Westinghouse switches and transformers are used throughout on the line.

The rails are bonded at the joints with duplex bonds concealed by the angle bars and composed of stranded copper having a cross-section equivalent to No. 0000 wire. The bonds are of the steel pin terminal type and are 24 in. long. Cross bonding is provided every 3000 ft. at the center of the impedance bonds which are at the ends of the track signal circuits. No return feeder is used, the track being ample to carry the small return currents.

Lightning protection for the overhead lines is afforded by means of the grounded main messenger cables or main



New York, Westchester & Boston—Compound Catenary on Double-Track Tangent

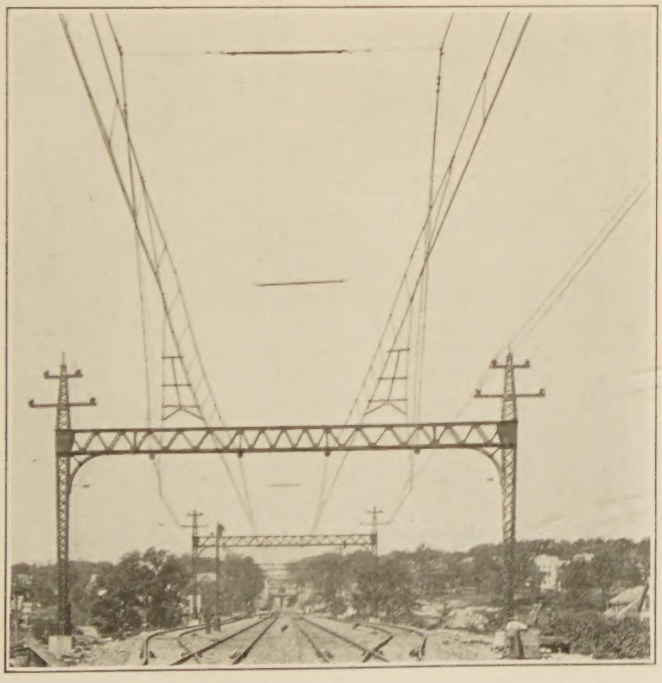


New York, Westchester & Boston—Arrangement of Compound Catenary on Six-Degree Curve

supporting strands which carry the track conductors of the compound catenary construction. Protection for the single catenary construction on the New Rochelle branch is provided by a grounded wire carried above the feeder wires on the catenary bridges. This wire is shown in the illustrations of the single catenary construction as supported by a pin at the extreme top of the posts. The apparently limited amount of lightning protection is due to the fact that the insulators on the line have an extremely high safety factor, 110,000 volts being their electrical strength. This is ten times the working voltage, but experience on the New Haven railroad has shown that the increased safety which the excess insulation provides is quite inexpensive and reduces insulator trouble absolutely to accidental breakage through exterior causes.

COMPOUND CATENARY CONSTRUCTION

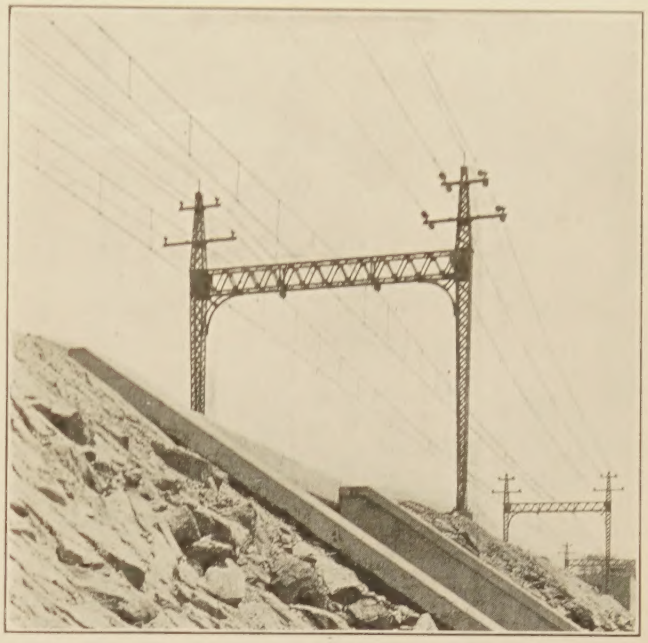
The four-track section of the line extending from Harlem River to Columbus Avenue is all equipped with a compound catenary. As shown in the accompanying page illustrations, this consists of a main supporting cable of ⅞-in. extra-high-strength steel strand carried over the top member of the catenary bridges and fastened to them with cast-iron clamps. These wires are in consequence grounded. Between each pair of bridges are two intermediate cross bents composed of 3-in. I-beams weighing 5½ lb. per foot and clamped to each one of the main supporting cables. Hung from the intermediate cross bents are track catenary supporting strands of ⅝-in. extra-high-strength stranded steel cable. These cables are insulated from the intermediate cross bents by 110,000-volt insulators, which were furnished by the Ohio Brass Company. Underneath the track catenary supporting strands and hung from them at 10-ft. intervals by means of standard New Haven type hangers is a horizontal No. 0000 grooved copper wire, and 2½-in. below this is a No. 0000 grooved steel contact wire. These two wires are connected at 10-ft. intervals by clips spaced so as to come midway between the hangers from the track catenary supporting strands. The alternate spacing of clips



New York, Westchester & Boston—Pantograph Deflector at Turn-Out

and hangers gives a high degree of flexibility to the contact wire. At curves, however, the hangers are attached directly to the clips. This is done to preserve the vertical alignment of the two wires independent of side strains. Flexibility is obtained through the angularity of the hangers which exists on all curves. The illustration of the single catenary at the end of a tangent shows this feature, which is the same in both types of catenary, the change from alternate spacing of clips and hangers to coincident location of the two taking place directly under the catenary bridge shown in the foreground.

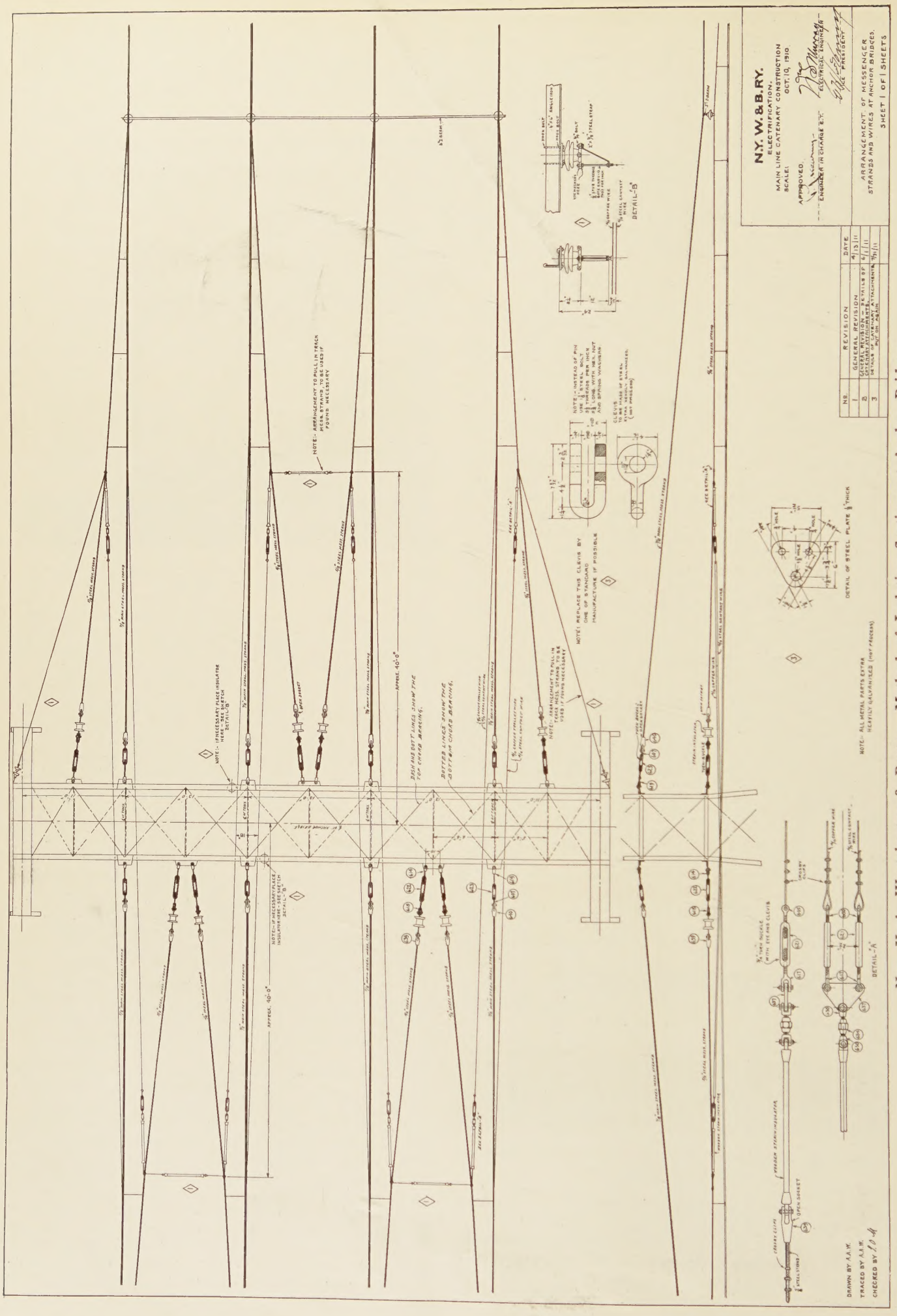
The hangers are composed of a ½-in. steel rod threaded



New York, Westchester & Boston—Single Catenary at End of Tangent

on the end and screwed into a hook-shaped casting which hangs over the track catenary supporting strand. The rod is screwed into the casting until it rests solidly against the supporting wire and holds the hanger securely in place. On tangents the lower end of the ½-in. hanger rod is screwed into a casting of which the lower part forms a clamp which fits into the groove of the track conductor cable. This clamp is made up of two pieces of malleable iron held firmly in the groove of the cable by means of a ¼-in. flat-head machine screw which passes through both pieces of the clamp. On curves, where the hangers are fastened directly to the clips which hold the track conductor and the contact wire together, the lower part of the hanger is bent to the proper angle, so that the track conductor can take its proper position over the center of the track, and the end of the hanger passes horizontally through the clip. This horizontal end of the hanger is upset to form a shoulder and the end is threaded for a ½-in. nut. The threaded end is passed through a hole in the clip and the nut on it is set up until the clip grips the two wires on account of the pressure between the nut and the shoulder. The clips between the track conductor and the contact wire are standard throughout the entire line. The upper portion of the clip is extended to surround the upper wire completely, but the lower portion does not extend below the groove in the contact wire.

At turnouts where two contact wires have to be brought together a special clip is used which consists of three parts, one of which is placed between the two wires, the other two parts forming the outsides of the clamp. All three parts are gripped firmly on the two wires by means of ½-in. machine screws passing through all three parts. These clips are approximately 6 in. long and have two screws to each clip in order to exert more gripping pressure than is provided by the ordinary clip. This is required on account of unbalanced tension in the diverging wire. The clips and hangers are exactly similar to those described in the ELECTRIC RAILWAY JOURNAL for April 16, 1910, page 700. Their use is standard on the New York, New Haven & Hartford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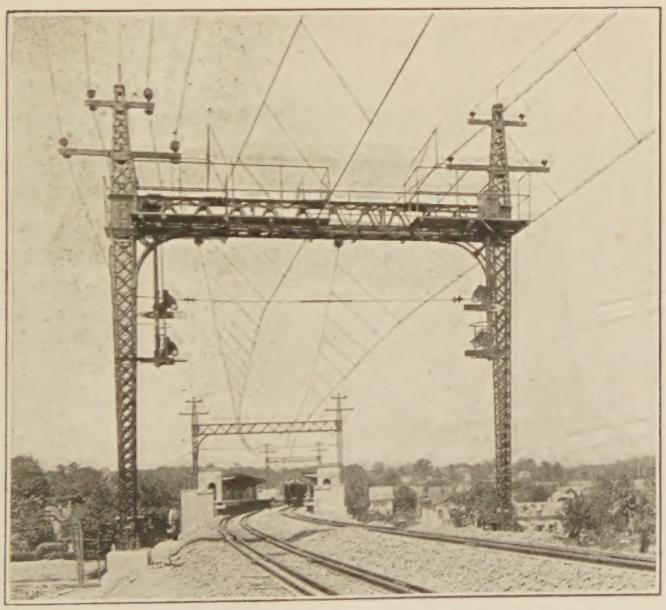
No. REVISION DATE
1 GENERAL REVISION 4/13/11
2 GENERAL REVISION — DETAILS OF 6/1/11
3 DETAILS OF ATTACHMENTS 7/5/11
DRAWN BY A.A.W.
TRACED BY A.A.W.
CHECKED BY A.D.M.
NOTE:- ARRANGEMENT TO PULL IN TRACK MESS. STRAND, TO BE USED IF FOUND NECESSARY
NOTE:- IF NECESSARY PLACE INSULATOR HERE - SEE SKETCH DETAIL-'B'
NOTE:- IF NECESSARY PLACE INSULATOR HERE - SEE SKETCH DETAIL-'B'
APPROX. 40'-0"
APPROX. 40'-0"
DASH AND DOT LINES SHOW THE TOP CHORD ARRANGE.
DOTTED LINES SHOW THE BOTTOM CHORD ARRANGE.
NOTE:- ARRANGEMENT TO PULL IN TRACK MESS. STRAND TO BE USED IF FOUND NECESSARY
NOTE:- REPLACE THIS CLEVIS BY ONE OF STANDARD MANUFACTURE IF POSSIBLE
NOTE:- ALL METAL PARTS EXTRA HEAVILY GALVANIZED (HOT PROCESS)
DETAIL OF STEEL PLATE ½" THICK
DETAIL-'A'
DETAIL-'B'

New York, Westchester & Boston—Method of Isolating Sections at Anchor Bridges

Railroad, where they have been in successful use for several years. The spacing of 10 ft. both between the hangers and between clips is maintained over the entire line.

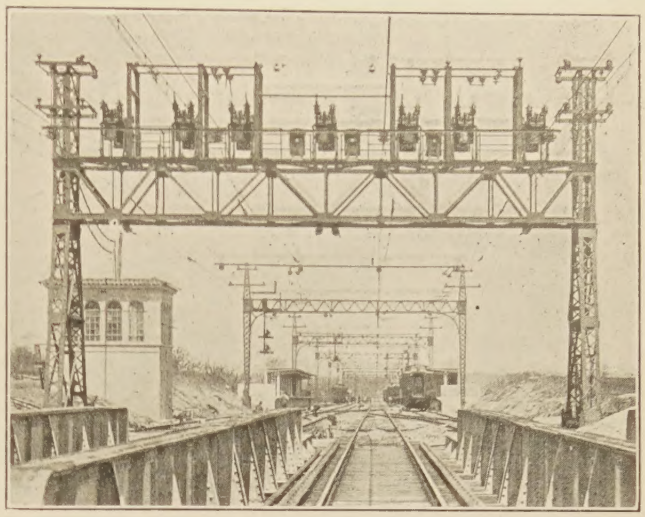
Bridges are spaced 300 ft. apart on all tangents. At curves, however, and at some of the overhead highway crossings the spacing has to be reduced. On curves up to 2 deg. the track conductor and contact wires are centered on the track by offsetting the points of support of the main supporting strands on top of the bridge. This condition is shown in the foreground of the illustration of the four-track curve. Curves of over 2 deg. have the catenary bridge spacing reduced in accordance with the curvature to a minimum of 200 ft. On curves of over 4 deg. deflection, pull-off poles are erected between the bridges and the main supporting strand receives a side strain by means of 5/8-in. steel strand pull-off wires. A great deal of care has been used in centering the contact wires over the truck. The results are shown in the various illustrations of curves. In general, the construction has permitted a practically perfect alignment with the track curve so that at no time is the contact wire out of line with the center of the pantographs on the cars.

On curves or at other points where the bridges are brought closer together than the standard spacing of 100 yards the shorter span involves a decreased deflection of the main supporting cable in order to avoid unbalanced strain on the bridges. At such points bracket hangers, composed of two pieces of angle iron set 45 deg. from the vertical are introduced between the main supporting strand and the intermediate cross bent in order to make up the space between them, as the contact wire is maintained at a constant elevation of 22 ft. above the rail except at low overhead bridges. For such special cases the minimum height is approximately 17 ft. Typical bracket hangers are shown in the illustration of the four-track curve. At anchor bridges an especially ingenious method of isolating adjoining sections of the line without causing an actual break in the circuit has been devised. This is shown in the accompanying line cut of the arrangement. It will be seen from the cut that there is exposed to the pantograph a continuous surface of live contact wire, but that the contact



New York, Westchester & Boston—Single Catenary Construction at Curve

wires on each of the two adjoining sections at the anchor bridge are isolated from each other by insulators and by an air gap of 18 in. The objection to introducing a break in the contact wire is, of course, the damage which is done by the heavy arcs which are drawn off in breaking a circuit on account of the high voltage impressed on the line. At overhead bridges or stations the wires are supported on insulators hung from an I-beam which in turn is clipped to the bottom of the bridge member by a short piece of angle iron. The construction is shown in the half-tone on page 1011. This represents simple catenary construction. In the compound type the main messenger strand is clipped to the



New York, Westchester & Boston—Four-Track Anchor Bridge and Circuit Breakers

bottom of the bridge, leaving the rest of the construction exactly the same as for the single catenary. The main messenger strand is, as before mentioned, grounded so that no insulator is needed between it and the bridge.

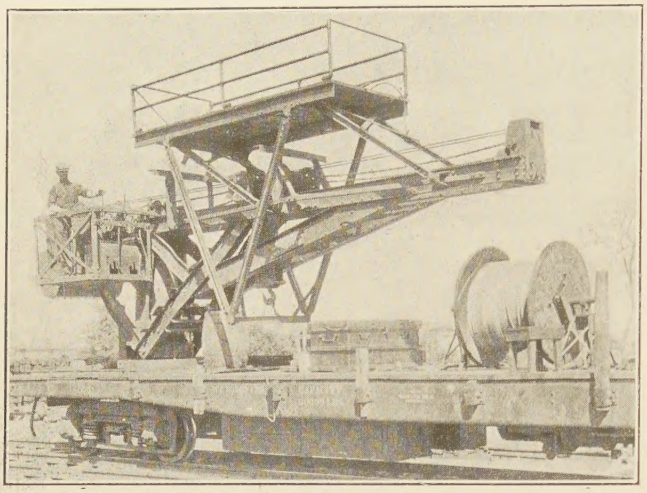
At turnouts or cross-overs where necessity exists for two contact wires to be brought together a deflector has been devised to prevent a pantograph from being caught on the diverging wire. As shown in the illustration on page 1007, this deflector is made up of small steel T-bars inverted and bent up at the ends to provide a horizontal guide between the two diverging contact wires. The pantographs on the cars are 5 ft. in transverse length and the deflector begins at the point where the two contact wires are 5 ft. apart, extending in toward the point of the "V" formed by the two wires until the space is reduced to 2 ft. The cross members shown are supports for the guide and are fastened on top of the copper track conductor wire at the clips. The two pieces forming a "Y" at the end of the guide are carried at the same level as the guide, sloping upward so as to ease the blow of a pantograph passing at high speed. The necessity for the deflector at turn-outs is on account of shock with which the side of the contact shoe of a slightly tilted pantograph strikes a diverging contact wire. The deflector rides up gradually on the pantograph and holds the wires clear until the pantograph has gone far enough toward the point of the "V" to permit both wires to ride on its contact shoe. When this condition exists the danger of the wire catching on the side of the shoe or being struck heavily by it is past.

The double-track branch between Columbus Avenue and White Plains is equipped with a compound catenary, and this is exactly similar to the four-track construction in all respects except that of width on bridge.

SINGLE CATENARY CONSTRUCTION

The New Rochelle branch has been equipped with the single catenary construction in order that the merits of this arrangement may be thoroughly tried out. Its action should be watched with interest. The difference between the single catenary and the compound consists in the elimination of the main supporting strand and the intermediate cross bents. The catenary, which is composed of 5/8-in. extra-high-strength steel strand, is swung over the clear length between adjoining catenary bridges and is hung from 110,000-volt insulators fastened to the under side of the trusses.

The No. 0000 copper track conductor wire and the No. 0000 grooved steel contact wire are hung from the catenary with hangers and clips in exactly the same manner as in the compound catenary construction. The only difference is that the hangers are, of course, very much longer at the points of support, the true catenary span being 300 ft. in-



New York, Westchester & Boston—Lowering Emergency Line Car Platform

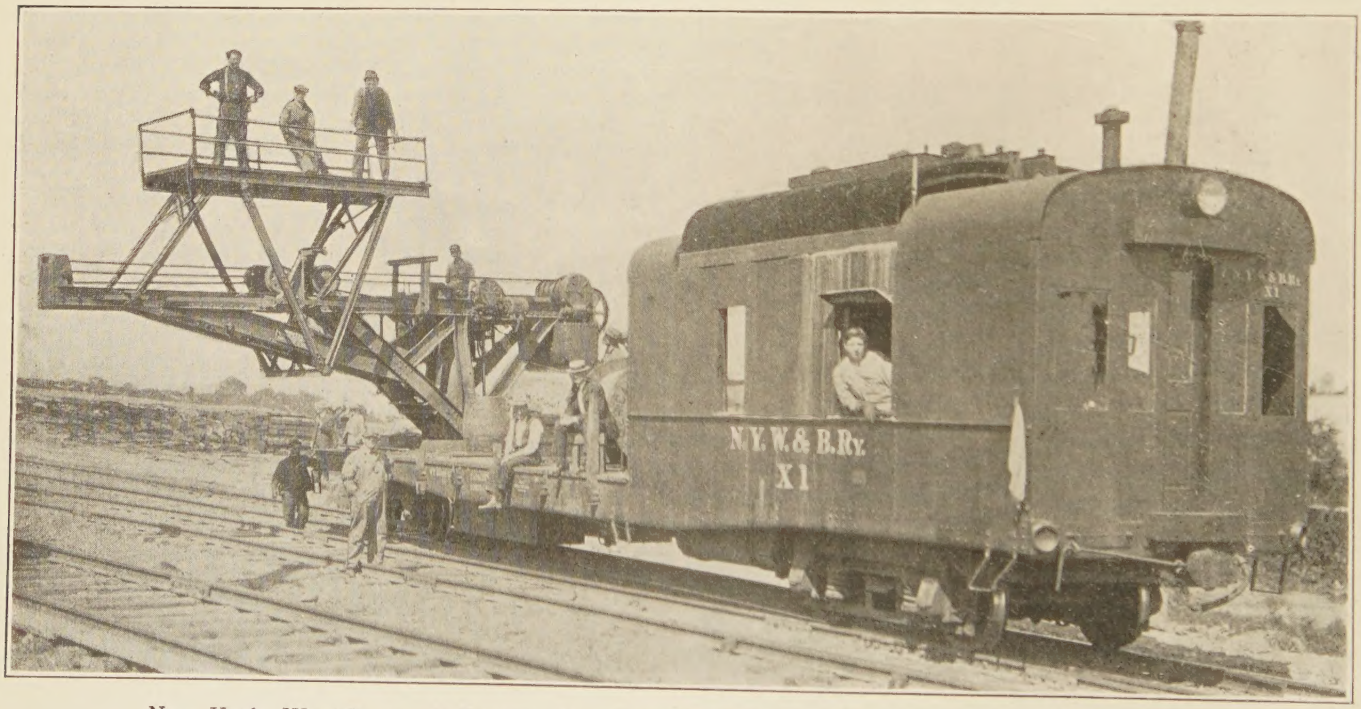
stead of the 150 ft. span of the compound type. The bridge spacing for the single catenary is 300 ft. on tangents, reducing to approximately 200 ft. on the sharpest curves. The contact wire over curves has a side strain given to it by pull-off wires either attached directly to the bridges or else to bridles between two adjoining bridges. Pull-off poles are located between bridges on curves greater than 4 deg.

CATENARY BRIDGES

The bridges which carry the overhead wires are of steel construction throughout and are supported on concrete foundations. In general the vertical posts are made up with four corner angles and diagonal lattice work on all four sides made of flat steel bars set at 45 deg. and riveted together at the intersections. At the bottoms of the posts ⅜-in. gusset plates are riveted to the corner angles and the two sides which stand parallel to the track have 6-in. x 6-in. x ½-in. angles riveted to them to form lugs for the anchor bolts. The posts for the four-track section measure 2 ft. lengthways with the track at both the top and the bottom, but the dimensions at right angles with the track are 1 ft. ½ in. at the bottom and 2 ft. 2 in. at the top, so that the cross-section of the post, viewed parallel with the track, shows a smaller dimension at the bottom than at the top. The reason for this is that the point of greatest moment occurs at the top of the post where it is joined to the bridge members which cross the track. The same general design applies to double track.

Gusset plates of 5/16-in. steel are riveted to the two sides of each post which stand at right angles to the track. This provides a solid side for the top 3½ ft. of the post. To these gusset plates are riveted the cross bridges, which for the four-track construction are made up of two trusses 3 ft. 6 in. deep. The top and bottom members are made of heavy angles and are connected by diagonals and verticals made up of angles which are fastened to 5/16-in. gusset plates at the points of intersection. The two trusses are tied together with a single lattice work of 2½-in. x ½-in. x 5/16-in. angle at the top and at the bottom. Diagonal cross-frame supports between the two trusses are installed every 13 ft. to prevent any tendency to buckle. On tangents the distance between the top of the truss and the top of the rail is 31 ft., but this is reduced under special circumstances. Double-track bridges have trusses 3 ft. deep but are otherwise similar. In all cases the top and bottom truss members are sufficiently heavy to avoid necessity for carrying loads at the panel points.

Four foundation bolts are set in pairs on the two sides of the post which stand parallel to the track. The bolts in each pair are 24 in. apart and all are carried down 7 ft. 2 in. into the concrete foundation, where they terminate with ¾-in. anchor plates 8 in. x 2 ft. 4 in. in size. The bolts are made of 1¾-in. round steel upset and are threaded for a 2⅛-in. nut at the ends. The foundations for the four-track construction have top dimensions of 3 ft. 6 in. x 3 ft. 6 in. and are spread out by three steps each 2 ft. high to dimensions of 7 ft. x 8 ft. Below this, if necessary, the concrete is carried down to good bearing soil. On curves where the side strain is heavy the foundation dimensions are increased to 8 ft. by 11 ft.



New York, Westchester & Boston—Emergency Line Car with Working Platform Raised

The design of the catenary bridges has been varied to suit

the different loads which come upon them and no attempt to make universal standard was carried out. The construction of the bridges on curves differs from that on the tangents and the four-track bridges are considerably heavier than the two-track. In general, however, the design of all bridges was based upon a condition wherein all wires were surrounded by a coating of ½ in. of ice, or, in other words, the diameter of each wire was increased 1 in. The dead weight of ice and wire was computed on this basis. The wind load was then taken at 6 lb. per square foot of projected area, including the coating of ice, or 20 lb. with bare wire.

This method of establishing the loading is an arbitrary one based upon the fact that during a period of heavy wind the ice coating would be shaken off the wires so that the two conditions of maximum ice load and maximum wind load would not occur together. The condition of a wind load of 6 lb. plus a dead load due to ½-in. coating of ice was found to be the most severe on curves owing to the additional pull of the wires on account of the low temperature. On tangents the worst conditions were found to be caused by the wind load only on bare wire.

OVERHEAD LINE MAINTENANCE

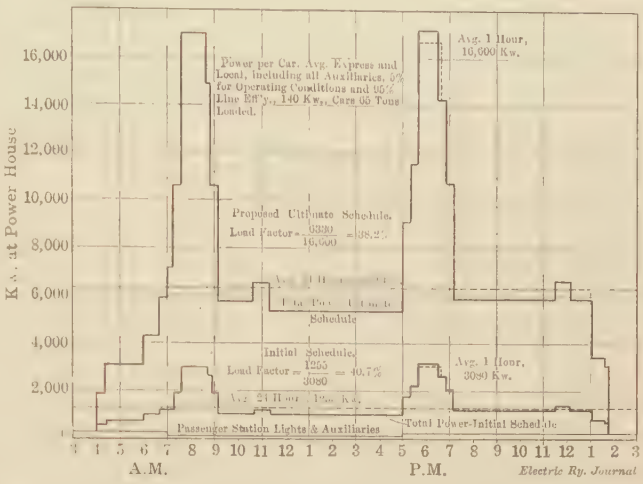
Special provision has been made for continuity of electric service. The circuit breakers which separate the road into five different sections are installed at the anchor bridges. The latter are located at the terminals of the four-track section and the two double-track branches. Intermediate bridges are also located at the Columbus Avenue junction and at the middle points of the four-track section and of the long White Plains branch. By means of the circuit breakers any one of the tracks in any of the sections can be cut out of service for making repairs. No live line work is attempted, as the high voltage and grounded overhead wires make such procedure too dangerous. Whenever work is to be done on any one of the lines it is first isolated by the circuit breakers at each end of the section and the line is then grounded to the rail with a temporary connection as a further protection against accidental charging.

GAS-ELECTRIC REPAIR CAR

One of the most interesting features of the line-maintenance methods is the gas-electric repair car with which

New York, Westchester & Boston—Cable Supports Under Low Bridge

the road is equipped. This car has a General Electric gasoline-engine-driven d. c. generating set which supplies current to motors on the axles for running the car, and also to motors for operating the revolving jib crane which is shown in the illustration. The crane, which was built by the Whiting Foundry Equipment Company, has an adjustable hook which is available for all kinds of light wrecking work, the capacity being 10 tons on a lift close to the car or 3 tons when the hook is at the extreme end of the boom. This hook is also used to elevate the lineman's platform. The latter process is accomplished by catching the hook in a frame which extends down from the platform, the latter ris-



New York, Westchester & Boston—Power House Load Curve for Average Winter Conditions

ing on four parallel-motion arms, each pivoted to the boom at one end and to the ends of the platform at the other.

This device keeps the platform horizontal at all times. The platform can be raised to any desired height and, as shown in one of the illustrations, the boom can be swung sidewise so that the linemen can work over tracks adjacent to the one on which the car happens to be standing. The car, being independently operated, can go to any point on the line, regardless of whether the current is on the line or not. The maximum speed is about 30 m.p.h.

LIGHTING AND POWER CIRCUITS

The main power circuit, including the feeders, receives single-phase current from the power house at 25 cycles. Lighting for the stations is transformed from this circuit through duplicate transformers at each station to 110 volts.

Switches at each station are provided to permit using any one of the feeders for the lighting supply so that the continuity of the lighting circuit is assured. However, in the underground section of the line which runs for 4000 ft. north of Morris Park an emergency service from an exterior source is contemplated. This connection will be strictly an emergency one and is only to be used in case the main supply of power from the Cos Cob power station should fail completely. Power for operating motors, elevators and air compressors as required on the line is transformed from a three-phase, 11,000-volt circuit, of which one leg is composed of the main feeders, another leg composed of the track return and the third leg composed of a power wire which is carried overhead on the catenary bridges.

The overhead circuits therefore comprise the following were, in addition to the track catenaries: on the New Rochelle branch, four No. 3 signal circuits and four No. 0000 feeders, two of each of which are located on each side of the track; on the four-track section, four No. 3 signal wires, two of which are located on each side of the track, one No. 0000 feeder on each side of the track, and one No. 3 third-phase power wire and one No. 3 control wire for the circuit breakers on opposite sides of the track. The branch to White Plains has the same wire arrangement as the four-track section. The third-phase wire and the control wire are brought from the point of intersection of the road with the New Haven at Mount Vernon. They are not carried over the New Rochelle branch, as there are no motors or circuit breakers except at the ends of that section.

Technical Papers at the Cedar Point Meeting

The Subjects Discussed Included the Analysis of Interurban Traffic with Relation to Timetables, Box Frame Versus Split Frame Railway Motors, Publicity, Transmission Lines, Standardization and Sale of Current Along Interurban Lines

INTERURBAN TRAFFIC ANALYSIS WITH ITS RELATION TO TIMETABLES

BY A. J. BOARDMAN, SUPERINTENDENT TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

To one who has been used to watching city traffic, which closely follows the prescribed a. m., noon and p. m. load curves, varying as a rule only in magnitude with the population served and the local conditions, interurban traffic presents an interesting and complex study. In spite of close observation and good reasoning, timetables are often put into effect on interurban roads which, while theoretically correct, result in loss of traffic and complaints from dissatisfied patrons. This would not have been the case if the data in the auditor's office had been carefully used to help determine the proper character and kind of service.

The problems of schedules, average speeds, layover times, maximum load periods, passenger counts, seating capacity utilized and furnished and relation between car miles and passengers handled during the a. m. rush hour, the noon rush hour and the p. m. rush hour, etc., have long since been studied by the city companies, but the importance of some of these fundamentals, as ultimately affecting a timetable, has been underestimated by many interurban roads.

However, in 1911 the committee on schedules of the American Electric Railway Transportation & Traffic Association made the following recommendations:

"The committee wishes to recommend that all member companies make daily records of passenger business by trains, feeling that such records are necessary statistics, not alone for the proper construction of schedules and timetables, but as well for the purpose of comparison with past results, and as essential factors in developing estimates of future operation."

DETERMINING FACTORS OF A TIMETABLE

In the promotion of interurban roads much stress has been laid upon the character and density of population, and as they ultimately affect schedules they are considered briefly.

It was at one time assumed in many quarters that, owing to favorable conditions, interurban roads in Ohio could earn from 20 per cent to 25 per cent more than the adjacent roads in Indiana. The reason given was that there was more manufacturing in Ohio than in Indiana, and this would tend to create travel not found in agricultural districts. The rapid development of interurbans in Indiana seems to contradict this theory and proves that a prosperous agricultural population which is not too far removed from urban centers is quite as ready to use transportation facilities as one which is devoted to manufacturing.

The ratio of rural population to total population in 1907 was: Indiana, 72.2 per cent; Ohio, 58.1 per cent; Illinois, 49.3 per cent.

Indiana has a population of 7.35 people per square mile, against 9.8 for Ohio, 11.4 for Illinois and 18.5 for New York, yet it is high (eleventh) in steam mileage and seventh in electric railway mileage among the states of the Union.

It is impossible to state the exact minimum tributary population, excluding that in the main terminal, that is necessary to support an interurban road. In Indiana I should judge it to be about 1200, with a total tributary population, excluding all cities and towns, per mile of about 400; that is, when Indianapolis is one terminal.

There is a definite relation between the population and the number of passengers handled on electric railways. Unfortunately the United States census statistics are not complete on the subject. The figures by states in 1907 are shown in Table I.

Table I.—Populations and Rides per Inhabitant in Four Central States

	Population	Average Number Rides per Inhabitant (Total Population)
Illinois	5,518,190	127
Ohio	4,497,198	107
Indiana	2,700,876	50
Kentucky	2,349,152	37

A further census on this subject should separate the rides per inhabitant for urban and interurban companies. This would show clearly the development of electric railways with the different characters of population and it would be of great importance in promoting future interurban railways.

In 1911 we carried our tributary population, which is estimated at 326,000 for the division between Indianapolis and Terre Haute, 4.6 times. Excluding the main terminal, the tributary population would be about 107,000, so that the

Table II.—Distribution of Travel and Revenue, Based on One-Way Fare

Mileage of Division	Class I. Passengers Carried from Terminal to Terminal. Per Cent of Total	Per Cent of Revenue Derived from Passengers in Class I	Class II. Passengers Between Intermediate Towns or Between Intermediate Towns and Terminals. Per Cent of Total	Per Cent of Revenue Derived from Passengers in Class II	Class III. Passengers Between Intermediate Towns or Terminals and Country Stops. Per Cent of Total	Per Cent of Revenue Derived from Passengers in Class III	Class IV. Passengers Between Country Stops. Per Cent of Total	Per Cent of Revenue from Passengers in Class IV	Sum of Revenues from Classes I and II. Per Cent of Total Revenue
14	30.56	50.49	40.32	28.12	28.65	21.17	.47	.22	78.61
16	24.81	47.51	41.74	23.29	32.20	28.56	1.25	.64	70.80
20	33.65	55.87	18.64	14.95	45.74	28.39	1.97	.79	70.82
[illegible]	31.80	62.28	39.48	26.07	27.96	11.43	.76	.23	88.35
26	14.46	33.51	58.44	50.74	26.30	15.47	.71	.29	84.25
30	17.86	40.36	62.51	50.07	19.44	9.52	.19	.05	90.43
40	9.37	26.25	65.04	60.97	65.04	12.47	.80	.32	87.22
68	7.05	22.15	57.59	62.38	33.94	14.97	1.42	.50	84.53
68	4.55	20.32	79.69	71.98	15.38	7.53	.38	.17	92.30

average number of rides per year per inhabitant, exclusive of the population in the main terminal, was 14.1 during 1911. This shows a highly developed riding habit for a rural population.

OF WHAT THE TRAVEL ACTUALLY CONSISTS

An examination made on nine divisions to determine the distribution of travel and the revenue based on one-way

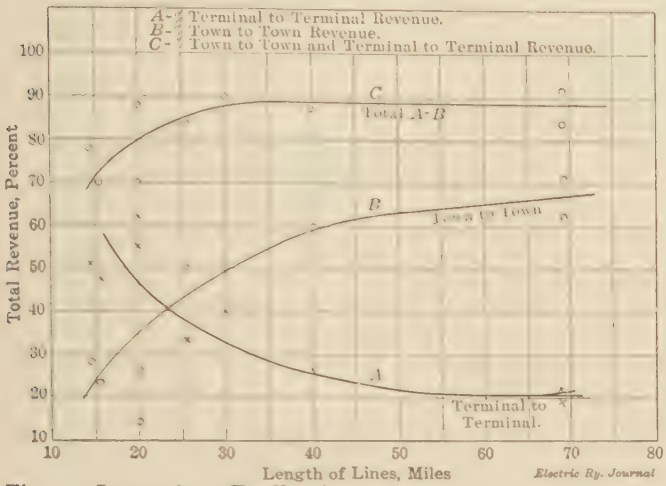


Fig. 1—Interurban Traffic Analysis—Curves Showing Relation Between Length of Road and Kind of Travel

fare showed very singular results. They cover a period of seven days and are presented in Table II.

With local and limited service the travel was divided into four classes: namely, class I, terminal to terminal; class II, town to town; class III, country stops to towns, and class IV, country stops to country stops. Class II includes passengers from terminals to intermediate towns, and in class III "towns" are understood to include terminals. These divisions vary from 14 miles to 70 miles in length. Fig. 1 shows the total percentage of revenue from town to town and terminal to terminal passengers. This is the most important result and is the basis of future timetables. Table II and Fig. 1 show definite relations between the length of the lines and kinds of travel and the total per cent of revenue from each. They also show a definite relation between the length of the different roads and the kind of travel on each. Thus a short road of 15 miles to 20 miles has a maximum of town to country stops and of terminal to terminal travel. In other words, the travel developed on a short road of this kind originates and ends to a large extent on the line and thus can be considered to be largely local. As the length of the road increases, the percentage of terminal to terminal travel diminishes and the percentage of town to country road travel also falls off. But the town to town travel increases. The values as shown are not fixed since they are determined by the conditions peculiar to the locality. For instance, we have found that the through travel varies with the competition of steam or other electric railways, and it can be stimulated by means of increased service, faster time, advertising, interline business and reliability of service. If we have analyses like the foregoing to work from, there is no further necessity for guesswork in making out a timetable for various kinds of service.

THE LONG HAUL IDEA

As late as 1907, at a Central Electric Traffic Association meeting at Indianapolis, the question was raised as to whether it paid to cater to long distance travel. The electric railway census report of the same year says: "The interurban electric railway is still in the transition period trying to retain the advantages of short haul while developing the long-distance travel."

On three divisions of approximately 70 miles in length we have found that while terminal to terminal passengers numbered only from 5 per cent to 10 per cent of the total number of passengers hauled, the revenue derived from them varied from 10 per cent to 20 per cent of the total revenue of the division. When 70 per cent to 90 per cent of the total revenue is derived from passengers who are traveling from town to town or from one end of the road to the other, there is no longer any doubt as to the advisability of putting on the kind of service that will take care of and stimulate this most profitable class of travel.

The average length of journey per passenger on the steam railroads was 24.47 miles in 1889 and 31.72 in 1907. The average ride per passenger on limited cars between Indianapolis and Terre Haute was 30.02 miles in 1907, but it

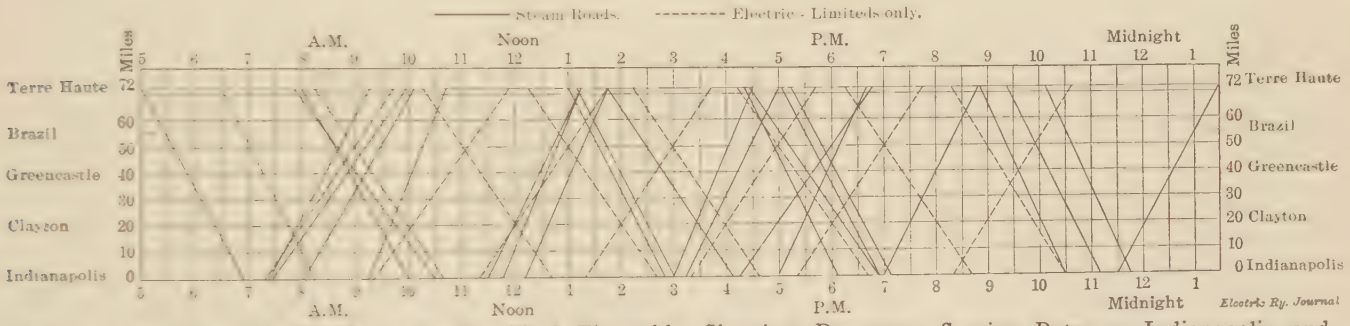


Fig. 2—Interurban Traffic Analysis—Graphical Timetable Showing Passenger Service Between Indianapolis and Terre Haute

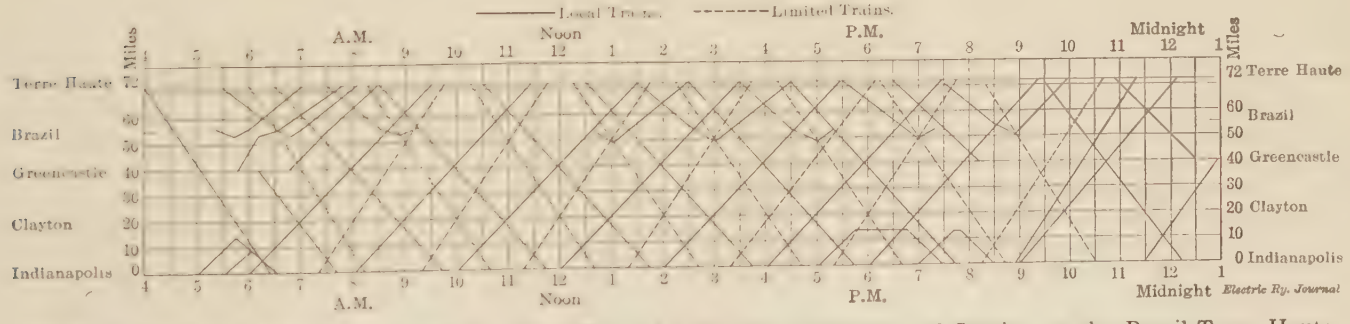


Fig. 3—Interurban Traffic Analysis—Graphical Timetable Showing Character of Service on the Brazil-Terre Haute Divisions—First-Class Trains Only

is probably longer to-day. The average length of journey per passenger on local cars is about 11 miles.

COMPETITION OF STEAM AND ELECTRIC ROADS

The competition of the steam and electric roads between Indianapolis and Terre Haute is shown clearly in Fig. 2. Although we closely parallel the main line of two railroads, it was found advisable and later profitable to increase the number of limited trains between the points named to make a strong bid for the business that is bound to come where there is frequent and reliable service. This was found to be especially true in very cold weather when the steam railroads were running from one hour to twenty hours late.

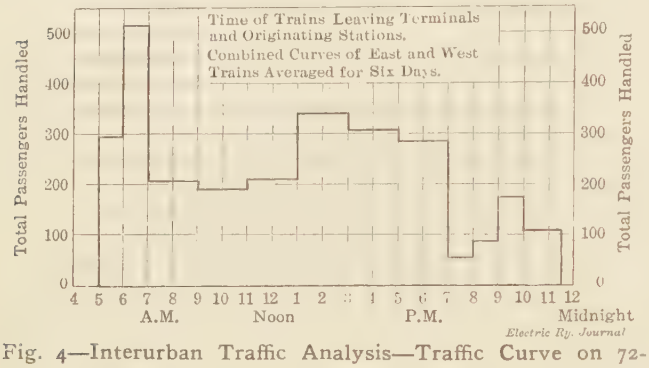


Fig. 4—Interurban Traffic Analysis—Traffic Curve on 72-Mile Division; Average for Six Days

Fig. 3 shows more in detail a graphic timetable which is arranged to conform with the requirements of the interurban traffic analysis, namely, every other car a limited. The timetable has been found so satisfactory that the service on the other divisions is being changed as rapidly as possible to meet the demands of the traffic. The turnaround trains shown are peculiar to this locality and have no bearing on the through trains. This timetable was put on without any consideration of connections with the other electric roads at Indianapolis owing to the wide divergence in the departing and arriving of trains of our own and connecting lines and also because of the short time that a passenger would have to wait while making connections. The question of uniformity of leaving and arriving times of the limited trains out of a main terminal like Indianapolis is one which should be considered by the various railways if the interline business is to be developed to its greatest extent. In 1910 the interline business on the division between Indianapolis and Terre Haute, due to through checking of baggage and through ticket sales, amounted to more than 2 per cent of the total revenue. With better connections and advertising this percentage should increase considerably.

PERIODS OF TRAVEL DURING THE DAY

The periods of travel on an interurban line somewhat resemble those of a city railway, as they are divided into three periods as follows:

A—Period from 5.00 a. m. to 12.01 p. m.
B—Period from 12.01 p. m. to 6.01 p. m.
C—Period from 6.01 p. m. to midnight.

This similarity is clear from Fig. 4, which shows the total passengers handled on all trains on one division by the timetable presented in Fig. 3. The time for trains is the time they originate, while the total number of passengers for each train is plotted above. This curve represents the total number of passengers handled on east and west trains and averaged for six days. It is fairly representative. This curve is analyzed in Table III herewith.

TABLE III.—NUMBER OF PASSENGERS AND CAR MILES RUN DURING DIFFERENT PERIODS OF DAY

	Passengers	Per Cent of Total	Mileage	Per Cent of Total
Period up to 12.01 p.m.—A...	1905	43.9	1170.23	43.5
From noon to 6.01 p.m.—B...	1912	44.0	994.63	36.8
Period after 6.01 p.m.—C...	527	12.1	530.50	19.7
Total	4344	100.00	2695.36	100.00

In the period after 6.01 p. m. the per cent. of mileage is too large for the number of passengers handled, and in this particular case it was found that some 150 miles a day could be eliminated, thus effecting a considerable saving in a year. For nine months in the year thousands of car miles are run in the period after 6.01 p. m. to give thinly settled districts throughout Indiana a service that is not required and that is a dead loss to the interurban companies. Ninety per cent of our travel is between 6 a. m. and 7 p. m. The distribution of mileage throughout the day on any timetable should be carefully considered not only in new but in present interurban timetables.

GENERAL

The factors mentioned in the foregoing paragraph are among those which should influence the making of an interurban timetable. They show the necessity for systematic investigation of the traffic conditions if the maximum earning efficiency of a timetable is to be realized.

This paper has not touched on physical or franchise limitations, local ordinances, schedule speeds, free running speeds, the most efficient gear ratios for cars that alternate on local and limited runs, proper layover time, per cent of surplus cars for a schedule, standardization of leaving times, timetables of connecting roads both steam and electric, the proper consideration of the demands of the patrons, publicity or proper working hours for the trainmen. These are a few of the many interesting subjects that enter into the construction of an interurban timetable and must be harmonized for the safety and convenience of the traveling public.

BOX FRAME VERSUS SPLIT FRAME RAILWAY MOTOR

BY M. B. LAMBERT, WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

It is generally agreed that the box frame for railway motors rating above 75-hp capacity is preferable on account of the general mechanical problem, including weight, space and stresses, but for sizes below 75 hp opinion is divided, with the majority somewhat in favor of the split frame. The writer thought it might prove interesting to railway men throughout the country to bring this subject up for discussion before this association to crystallize opinion so that one or the other type may be standardized. From the manufacturing standpoint it is highly desirable that all the energies and economies of manufacture should be concentrated on one type. Each type requires its distinctive equipment of special and costly machinery and tools, and this doubled expense, together with the overhead charges of carrying a double line of stocks, must be ultimately assumed by the buyer.

Several years ago, when thinking railway men began actively to search around for ways and means to reduce the cost of upkeep on railway motors, it was found that a considerable portion of the high cost was due to the weak frame construction, and one solution for this was to make the frame solid or what is commonly called the box frame. Another solution was to improve the split-frame construction. Both of these schemes have been carried out with marked success.

The modern split-frame motor has been improved to such a point that there is very little difference in the cost of upkeep between it and the box type where proper inspection and overhauling is carried out, but when an ultimate operating life of twenty years is to be expected the split frame cannot be considered as foolproof as the box type. There is always a chance that the bolts will not be pulled tightly at some time, and serious damage may result.

The disadvantages of the split-frame type may be mentioned as follows:

(1) Necessity for inspection of bolts.

(2) The continued alignment of armature bearings not as effectively secured.

(3) Not quite as oil-tight and water-tight as the box type.

(4) Gear case lugs are wholly on the frame. In case these are broken the frames may have to be scrapped.

(5) The split frame introduces somewhat greater weight and is somewhat more expensive to make.

(6) Leads have to be brought out around the split for disconnection in order to drop the lower half of the frame. This adds an element of weakness.

(7) Where field-control motors are used for greater economy in power consumption, the split-frame motor is undesirable, on account of the extra leads which have to be brought out for disconnection.

(8) In the operation of open motors to gain saving in weight and a higher motor capacity, special ventilating features, such as a fan on the rear end of the motor armature, cannot be effectively used on account of the small diameter of the bearing housings.

These disadvantages are considered to be of minor importance by many operating men, especially by those on very small roads with few cars and fewer facilities, as well as by many on large systems with numerous inspection barns. These roads justly point to the fact that, though requiring somewhat extra attention, the later designs of the split motor are fully as reliable as the box, while the ease of making light repairs and of replacing armatures, field coils and bearings in the pit, and without removing the motor from the truck, will more than outweigh all disadvantages.

The advantages of the split frame may be summed up as follows:

(1) More flexible for inspection.

(2) Less shop space required for changing armatures, field, etc.

(3) Fewer spare cars required, as a lone inspector can change an armature or field coil and return a car to service in a few hours without disturbing trucks or removing motor frame from trucks.

(4) Fewer shop appliances are required.

(5) Pits will always be needed for general inspection and repairs, and a portable pit jack is convenient and out of the way.

On the other hand, those who favor the box frame claim lower maintenance cost and greater reliability (i. e., elimination of loose frame trouble) and that the greater flexibility for inspection and repairs of the split frame are negligible, since the modern box-frame motors give little or no trouble between general overhauling periods. They state that they have had large numbers of box motors in service two years and upward, with but one or two failures.

They point also to the fact that the system of giving the motor a general overhaul at the end of a definite mileage is superseding the old repair-when-absolutely-needed method, and with it the need of quick and frequent repairs becomes greatly diminished. At each overhaul the motor is made practically as good as new and is sent out on the road with the assurance that it will stay out. It is evident that to get the best work out of any equipment it should be regularly overhauled. The necessity for regular overhauling is more important with the box-type motor.

Split frame advocates insist that such regularity cannot be maintained after equipments have been in service for a long time and argue that the lower cost of overhauling and the repairs made between overhaulings, on the split type, more than offset the somewhat extra cost of inspection of frame bolts. They claim also that no one can tell whether the insulation on an armature will stand another year and that the armature will either have to be re-wound or greater expense will be incurred in the removal and repair of the armature in the box type between overhauling periods. One advocate makes a statement that during a very heavy lightning storm forty or fifty armatures and field coils were damaged, but owing to the use of the split frame he was able to make all necessary repairs overnight and maintain his schedules on the next day.

Great progress has been made in the methods of operation and handling equipment, as shown in the layouts of the newer shops and carhouses, so that with the gradual retirement of the older types of motors, cars and equipments it is natural to expect that objections to the box motor which seem important now will gradually lose force.

Many of the objections to the box motor have no doubt been emphasized by a lack of familiarity in handling such motors.

In conclusion, the aims of the manufacturer and operating men are mutual in that both are striving for efficiency and reduction in costs. For these reasons both are interested in standardization, and as the box motor seems to be in the line of progress, it is the object of this paper to place the subject before you for general discussion, and we hope that some preference may be shown.

TALKING TO THE PUBLIC

BY A. D. E. VAN ZANDT, PUBLICITY AGENT DETROIT UNITED LINES

The advertising manager—the press agent—the director of publicity, call him what you will, has long been a part of the organization of the builders of stoves, the producers of cars and the designers of the innumerable fare boxes, while you gentlemen—and I specifically exempt the supply men present—haven't gone at it the same way. The wares you buy you hear of enthusiastically and often, and you want to hear of them because they give you new ideas. But what of the wares you sell?

You gentlemen who are operating railways are operating them for the purpose of selling your product—street car rides. The supply man comes to you with his letters, his circulars and his arguments to convince you that what he has to offer is the best, and he comes to you persistently and systematically. But how many of you gentlemen go to the people who are your customers—the riders—and tell them of what you have for sale, of the care you take in making your production?

It is quite true that some of the urban and interurban companies have done something to further publicity more or less recently and more or less systematically, but the railway that does it with the skill and enthusiasm of the builder of the automobile and the inventor of the latest brand of breakfast food is indeed a rarity.

Spasmodic advertising is better than none, but it is not so good as that advertising which is planned carefully and to a purpose. This applies to your business as well as to the other man's business.

Not worth advertising because you have no opposition? The commercial world gives you many illustrations of the man without a rival who lets his wares become known.

Not worth advertising because your customers know you? Even the village gravedigger lets it be known that he digs a grave worth resting in.

The electric railway field is one of relatively modern origin, and you have been so busy developing, changing and improving that you have not given due consideration to publicity. You have been so busy doing things that you have forgotten to tell the public what you have been doing, and while you have not been talking to the public the public has been talking about you.

Will the gentleman present whose railway has not been subject to adverse criticism kindly stand up?

How many towns are here represented where the populace admit they know less than you about running a railway?

Doesn't your fellow-citizen yield to the superior knowledge of his baker, his tailor, even his banker, and to the man who sells him his morning smoke, in their respective

fields of labor? But despite the fact that this same neighbor doesn't know the price of a rail or tie and couldn't tell you what a car cost, he will tell you how to operate your road.

I think some of you have recollections of street railway companies being called "grasping corporations" in capital letters and "usurpers of public streets" in bold type, and—but time is too fleeting to repeat all that you are called, especially when some one is running for office.

You are firm in the belief that your railway is honest, that it is giving just as good service as possible and probably a little better than returns warrant. You know that whereas the ordinary commercial enterprise builds itself greater as the business immediately in sight warrants, the business you represent is more often a pioneer waiting for the dim future to bring its returns.

That a public print should applaud a manufacturer for doing so much business that a 20 per cent dividend is possible while it will proclaim "robbery" if your management is able to find a 4 per cent return is one of the peculiarities of these modern years. It isn't fair to you; it isn't just to those who have placed their money in your enterprise; it isn't the square deal. Many of those who attack you do it malignantly. These are not the ones to whom your story will appeal, but it will appeal to the great mass of American people. It will take time, for they have long been fed on falsehood without denials from you. A disease of long standing cannot be cured over night, for the days of miracles are not with us.

When I had the honor to be invited to read a paper before this convention I took it that what was desired among other things was something about the series of talks we are now making in Detroit, of how we are trying to let the public know, and so I may be pardoned for any personal element that may appear.

May I take it for granted that you are familiar with the fact that the Detroit United Railway has been subjected somewhat to attacks in the press and on the hustings? I might add that as a former newspaper man I did my share on the typewriter.

For five years or more I have studied the several departments of our company; I have studied its constant desire to care for the trend of travel; I have studied its thoroughness in the car shops; I have studied its marvelous development in the art of track building; I have studied its ingenuity in the electrical fields, and I say now, and say it as emphatically as words can express one's thoughts, that in no walk of life have I ever seen such desire to do what is right and best and honest. I say now that if other railways have behind them the same uprightness of purpose and justness of cause as has the company with which I have the honor to be associated, there is no fear of all the white light of publicity.

The talks we are now making to the people are not particularly wonderful as examples of the advertising art. Since my connection with the company I have carried with me the idea that what the average men—the plain people—want and will read are simple talks, free from technical phrases, clear in their statements and clean in their arguments. These talks are now covering different phases of our service and of how to avoid accidents. We propose to treat of track construction and the life of tracks; we propose to discuss the work of building and repairing cars; we propose to discuss the constant care of the overhead department; we propose to discuss freight carrying and passenger carrying. In brief, the whole purpose is to educate the riders to the fact that there are other things to do in the street railway business besides collecting the fares. We propose to tell the truth about the business, its honesty in purpose, its honesty in service and its honesty in investment. We propose to make an aggressive fight, not a defensive one, that the truth may be known, and if it becomes necessary to hit heads we shall hit heads, for of the plain unadulterated truth the company is not ashamed.

STANDARDIZATION

BY R. N. HEMMING, SUPERINTENDENT OF MOTIVE POWER UNION TRACTION COMPANY OF INDIANA

Mr. Hemming's paper was principally a historical review of standardization as carried out during recent years by the government, national and international engineering societies and individual manufacturers. He showed that the establishment of standards was entirely consistent with progress. In fact, it was often one of the greatest promoters of progress through its encouragement of more efficient methods of production. The handbooks of standard steel sections, of electric wires and cables and of the fire underwriters were typical of the fruits of standardization which had been made accessible to all. Standardization was not only of value to the producer in permitting more economical production but of equal importance to the consumer, for it was the latter who finally paid for overhead costs such as development work, waste of material and special tools. Practically all manufacturing concerns had found that they had designed many parts which varied in unimportant details largely because engineers and draftsmen had no standards to guide them. Fears had been expressed that standardization would discourage individuality of design, but those who held this opinion overlooked the fact that standardization usually does not affect the assembling of the parts, which permits the individual mind full play. General standardization was possible along three lines, as follows: in the limitation of the number of forms and dimensions of the simpler elements of structures or machines, with sufficient latitude to meet all ordinary requirements; in the sense of fixing those properties and qualities of construction materials which have proved best in practice, and in specifying the tests and regulations which the user of such materials may demand before acceptance; lastly, in the promulgation of general rules as to the design and accuracy of workmanship of some largely used machines which will aid manufacturers to foresee demands.

In his historical review Mr. Hemming cited many interesting cases, such as the standardization of screw threads by Joseph Whitworth in 1841, the standardization of weights, measures and various types of meters by the United States Treasury and later by the Bureau of Standards, the pipe and pipe thread standards of the American Society of Mechanical Engineers, the standardization work of the American Institute of Electrical Engineers, of the International Society of Testing Materials, of the fire underwriters and of the several electric railway associations. Already enough individual standards had been adopted by the last-named associations to permit through traffic and complete interchangeability of cars from Albany, N. Y., almost to St. Louis, Mo. Based upon his four years' experience on the standardization committee of the Central Electric Railway Association, Mr. Hemming believed that there was yet too much individualism which crowded back the adoption of standards. There were too many operators who had accumulated standards of their own which had become obsolete, but rather than purchase thoroughly modern equipment they paid a higher price in order that they might continue to use obsolete types which could be interchanged with their own peculiar standards. So far the progress of standardization of car equipment had been greater on paper than in actual service.

A great many things still remained to be standardized. Thus, there should be a standard location of classification of flags, minimum and maximum sizes of carbon brushes for various types of motors and a standard headlight resistance hanger, the last designed possibly along the lines followed in the cradle suspension of the Westinghouse air compressor. He had already installed a standard hanger on his line and found it very profitable and inexpensive. A standard headlight resistance hanger was not used to change one manufacturer's resistance for another. This

interchange might be convenient in emergencies, but experience had shown that it was not desirable because each type of resistance was calibrated to meet the individual requirements of the corresponding headlight. Referring further to headlights, Mr. Hemming said that a standard location on the inside hood of the motorman's vestibule had been adopted by his company to protect the wire which was used for the headlight resistance. Practically all kinds of wire which had been furnished for these resistances had deteriorated rapidly where the headlight was subject to the weather.

In conclusion, the speaker said that one could see how very little had been accomplished upon comparing the standards which had been proposed and adopted with the fields wherein standardization is possible. Standardization need not necessarily apply to motors, axles, wheels, journals, etc., alone. It could also be applied to other things, such as system in organization, as in the adoption of certain periods for doing certain tasks at the most effective time.

SALE OF CURRENT TO MUNICIPALITIES AND INDUSTRIES ALONG INTERURBAN LINES

BY W. B. MILLIGAN, ELECTRICAL ENGINEER WESTERN OHIO RAILROAD

This is a subject that a few years ago would have been deemed entirely out of place in a meeting of railroad men assembled for the purpose of discussing ways and means of increasing the revenue and popularity of the electric railroad. But the railroad of yesterday is not the railroad of to-day and we find many lines have now awakened to the fact that for years they allowed a valuable source of income to lie neglected along their right-of-way.

If we examine the load curve of a power plant feeding an interurban line we invariably find a dark, ominous-looking valley extending from 8 p. m. to 4 a. m. If we investigate our cost sheets we find our fixed charges remain the same all through this period, so that really all we are receiving in return for this relief on our station is a few pounds of coal in our bunkers. This undoubtedly suggests that we ought to have something to fill up this valley on our load curve, but what can we secure? Then comes the thought: Street lights are burned all night; lights are used during the hours of darkness. We have a number of factories along our line that operate twenty-four hours per day. If we could secure this business it would help very materially in filling up this valley and incidentally bring in quite a few dollars which are now being credited in some other fellow's bankbook.

TWENTY-FIVE CYCLES NO OBJECTION

Possibly the greatest obstacle we encountered in the past was the fact that nearly all of us were using 25-cycle current because of its adaptability to long-distance transmission and substation work. To the lighting fraternity, who were firmly bound to the arbitrary standard of 60 cycles, 25 cycles was not suitable for light or power, and that was the end of it. The frequency was too low for street lamps, incandescent lamps would flicker, it would require the manufacturer to build a line of appliances for 25 cycles when he had just succeeded in getting 60 cycles adopted as a standard, and if the interurban lines wanted to sell current for lighting and power, they should install a frequency changer and raise the frequency to 60 cycles. This attitude of the manufacturers did much to check the advance of 25-cycle current for commercial lighting and power, and it was not until the Niagara Falls plant was installed that the manufacturers of electrical appliances began to take notice of the possibilities of 25-cycle apparatus. Once aroused to the fact that a market was being created for 25-cycle apparatus, the manufacturers made possible the use of 25-cycle current for commercial light and power.

In order that we may fully appreciate what has been accomplished, it might be well to consider how some of those objections to 25-cycle current have been met. We are frank to admit that series alternating-current street lamps are not satisfactory on 25-cycle current, but to-day no progressive city would consider installing series a.c. lamps. The metallic flame arc operating on direct current, with series tungstens for the outlying districts, or the new a. c. flame arc lamps would be used. As the usual method of obtaining direct current for operating flame arcs is by the use of a rectifier, 25 cycles are just as satisfactory for this purpose as 60 cycles. On incandescent lamps the argument is sometimes advanced that the eye can detect a flicker due to the low frequency. If you will place a carbon filament lamp on a 25-cycle circuit you will notice that the filament will vibrate, and this vibration is often erroneously called flickering. But so far as actual flickering of the light itself is concerned I doubt if there is one person present who can tell whether a lamp is operating on 25 or 60 cycles. However, this argument against 25 cycles is advanced only on carbon filament lamps, and as the number of carbon filament lamps used in the average business house or home is very small compared with the number of tungsten lamps in use, we can well afford to pass this without further consideration. On the tungsten lamp with the securely anchored filament the anti-25-cycle man becomes a joke.

DISTRIBUTION IN SMALL QUANTITIES FROM HIGH-TENSION LINES

The question of how to get our current to the consumer with a reasonable expenditure of money now arises. Along our high-tension line we have a small village of 1000 inhabitants which would be willing to use current, but the only thing we have available is, say, 33,000 volts. To build a small transformer station and install standard lightning protection and a high-tension transformer will bring the cost to a point where it is not profitable for the railroad company and quite beyond the means of the village. Then we must find some method of reducing the cost of the installation or lose the business. A canvass of the village shows that the maximum demand will not exceed 50 kw and that a day load of 30 hp in motors can be secured. As this motor load is located in the center of the village, 440 volts would be sufficient primary voltage to reach any part of the village, so we can meet the situation in the following manner: A 50-kva, three-phase, 33,000-to-440-volt, outdoor-type transformer is purchased and set on a rack built between two poles; a simple disconnecting switch, horn-gap lightning arresters and a set of horn-gap fuses are placed above the transformer; a tap is made to the high-tension line, and we are ready for business. The entire installation has cost us less than $900, including our meter for the power consumer.

We now have two methods of disposing of our lighting current. We can either sell it to the village at wholesale and let others build and operate the distribution system, or we can build and operate it ourselves. This is something that must be governed by local conditions. If the village authorities are infected with the municipal ownership idea, the logical way is to sell the current to the village. On the other hand, if the people are not antagonistic and are willing to co-operate with the company, the better plan is to build the distribution system and furnish service along with the current. For the one great mistake of municipal plants is that they do not appreciate the fact that service is just as important as current. In the event that the current is sold at wholesale to the village very little effort is ever made by them to secure additional consumers or to increase the sale of current. Hence we should have a clause in our contract granting us the privilege of sending our solicitors into the village to secure new consumers for the village.

Another inducement is to have a quantity contract, charging, say, 5 cents per kw-hr. for the first 1000 kw-hr. used

each month, 4 cents per kw-hr. for the next 2000 used each month, etc. This will at least secure the co-operation of the council with our solicitors in securing additional business for them. A street-lighting contract for, say, fifty 60-cp lamps at $30 per year will bring us a gross income of $1,500 and can be made practically automatic by the use of a time switch having an eight-day clock movement, so that an inspection of the lamps and winding the clock movement once each week is all the attendance required.

SALE OF ENERGY IN THE CITIES

Now that we have succeeded in getting into the villages along our lines, let us consider the cities. Why not handle them along the same lines? Quite a few of them are operating small plants of from 500-kw to 1000-kw capacity, with a production cost that is far above what our cost would be to deliver current to their switchboard. If the plant is owned by private capital, the owners are generally ready to take advantage of anything that will save money for them, but if it is a municipal plant we can move up our heavy artillery, build a permanent camp and make up our minds we shall have to do anything, short of murder, before the contract feels the imprint of the city seal. The municipal ownership advocates will shout from the housetops that "our beautiful little light plant, built thirty years ago and equipped with fine machinery, which has been in operation ever since, is now to be destroyed by the ruthless hand of a soulless corporation."

The next difficulty we shall encounter will be the municipal system of bookkeeping, which always shows a profit on the operation of the plant regardless of the true conditions. The writer has in mind one plant filled with worn-out machines, ten years out of date, and with a bonded indebtedness of $33,000, yet each year of operation has shown a handsome profit, according to municipal bookkeeping. Here is a situation that requires the patience of an Indian, the eloquence of Ingersoll and the deducing powers of Sherlock Holmes. No two propositions will measure up alike; consequently each contract will have to be secured along the lines of the least resistance. This can be determined only by getting on the ground and meeting the people. Public sentiment generally governs the situation, and a petition from the taxpayers asking the council to accept our proposition will do more than any other argument we can advance.

ELECTRICAL SUPPLY AS AN INDUCEMENT TO FACTORY LOCATION

We are spending time, money and energy to induce manufacturers to locate along our lines. We talk shipping facilities, steam road connection, available labor and sidings right at their plants, but do we ever tell them that we can furnish electric power to operate their factory more cheaply than they can possibly do it with steam, and that the cost of installing motors will be less than that of installing a steam plant? This argument may be the last straw needed to break down objections. If we decide to sell current for industrial power purposes, let us fix two things firmly in our minds before we approach a prospective consumer:

First, that electric power, properly installed, free from interruptions to the service and purchased at the right price, represents the present limit of man's inventive power. What the future may bring forth we cannot say, but to-day electric power, used under the above conditions, brings the satisfaction to the user of knowing that there is nothing better obtainable. We are wasting time trying to sell a man power until we have satisfied ourselves that the above statement is correct, for confidence in our proposition must act as the restorative after "Mr. Manufacturer" has placed a good hard blow beneath the belt line.

Second, our proposition to a prospective consumer must cover two things, current and service. It is impossible to furnish one without the other. Service would be useless without current and current would be equally useless without service. Service consists of a multitude of small things which are absolutely essential if we wish to obtain and retain a satisfied consumer. It begins with the first visit of the power man and continues throughout the life of the contract. It covers the proper installation of motors, suggestions for handling the load in the most economical manner, purchase of suitable equipment, instructions to the operators, immediate assistance in case of breakdown, accuracy in meter reading and billings, prompt attention to complaints, constant and adequate supply of current, a visit to the consumer's factory at least every ninety days in order to ascertain if current is being used in the most economical manner, etc. Let the consumer understand that we have more interest in the economical operation of his factory than the amount of his bill, and the result will be two blades of grass growing where one grew before.

CONCLUSION

In conclusion, it might be interesting to present a few figures on the profits derived from this class of business, and the following are taken from installations in actual operation:

No. 1. Street lighting with series tungsten lamps in a village having a population of 450; number of lamps, 15; size of lamps, 40-watt, series tungsten.

Cost of installation	$191.30
Cost of operation per year, including interest, depreciation, maintenance, current and lamp renewals	43.70
Gross income per year	300.00
Net income per year	[illegible]
Net income per kw-hr, cents	13.9

No. 2. Twenty horse-power in grain elevator, taking 400 volts a. c. from substation.

Cost of installation	$139.00
Cost of operation per year, including interest, depreciation, maintenance and current	72.75
Gross income per year	195.60
Net income per year	122.85

From this we see that the small consumer is worthy of our consideration, and, as the income from larger consumers is in proportion, we undoubtedly have discovered a source of undeveloped income along our lines. Let us go home from this convention with the determination of investigating just what power business exists along our lines. Write the manufacturers of electrical appliances, tell them you want to sell light and power and that you desire their co-operation. Talk to the mayors of those small villages along the line about light. See "Smith" and "Jones" about power for their factories; take them to see some motor-driven shops. Ask questions. If you find some condition you do not understand do not hesitate to ask someone who you think might know. Remember this is a comparatively new thing for us, and we must co-operate if we expect to get results. It is only a question of time until we shall all be working on the intensive farming idea and if this paper has done anything to bring out that idea the writer is well repaid.

PUBLIC SERVICE COMPANY SECTION

The first regular meeting of the American Electric Railway Association company section organized by the Public Service Railway, Newark, N. J., was held at Newark on Tuesday evening, June 11, 1912, with an attendance of 124 members. The secretary announced that since the last meeting fourteen additional applications for membership had been received, making a total of 170. A communication received from Secretary Donecker, of the American Electric Railway Association, explained the conditions pertaining to associate membership, and stated that standard forms of construction, by-laws and charter were now in process of preparation by the company section committee. The speakers of the evening were President McCarter, who discussed the growth of association work throughout the country; Mr. Donecker, who spoke on the history of the association; R. E. Danforth, general manager Public Service Railway, who delivered a talk on "The Electric Railway as a Business," and J. J. Burleigh, second vice-president Public Service Railway, on "Employees' Welfare."

TRANSMISSION LINES VERSUS FOREIGN LOW-POTENTIAL LINES

BY J. G. SWAIN, SUPERINTENDENT POWER AND SHOPS CLEVELAND, PAINESVILLE & EASTERN RAILROAD

During the past few years many papers have been written and considerable committee work has been done by the various engineering associations interested in the subject of line construction, with a view to preparing, if possible, a national standard specification for overhead line construction. In the beginning nearly all of the engineering associations interested in line construction appointed committees to make reports on a standard of line construction in which the particular association was interested. The Bell Telephone Company, Western Union Telegraph Company, Postal Telegraph Company and American Telephone & Telegraph Company have always had a standard specification covering their line construction. These specifications have been modified from time to time to keep pace with the development of the art. The Association of Telegraph Superintendents and the American Railway Engineering & Maintenance of Way Association, now the American Railway Association, have given considerable time and study to their particular branch of overhead line construction. The American Railway Engineering Association and the National Electric Light Association also appointed committees with a view to preparing a national standard specification covering their particular branch of overhead line construction. Each association has adopted the reports of its committees on line construction, and in a general way the members of the various associations are gradually constructing their lines, so far as their general conditions will permit, in accordance with the standards set up by their respective associations. All of this work has unquestionably been a step in the right direction toward efficient and economical construction. It has been found, however, there is a great divergence of views between the various associations as to what constitutes good safe construction, where the lines of one association, so to speak, interfered or came in close proximity with those of another. These differences becoming more manifest in the field, it was evident that in the interest of good and economical construction it was necessary for the high-potential and low-potential interests to reach an understanding as to what would constitute good rational construction, at the same time safeguarding the interests of both.

The trouble between the high-potential and low-potential interests dates back to about the time the Westinghouse company was endeavoring to introduce alternating-current distribution. The Edison interests—that is, the Edison lighting companies—having large investments in copper underground, feared that the introduction of alternating current at the then extremely high potential of 2300 volts would result in loss to them owing to a competing company coming into the field and, on a much lower investment, giving the same service over a greater territory. There was a bitter fight, in the course of which the terrors of 2300-volt alternating current were painted in the most flaming colors, and there was caused a hysterical fear of alternating current which by no means has subsided to date. At least the low-potential interests, such as the telephone and telegraph companies, always keep the flames burning.

In the beginning the Western Union Telegraph Company paid little attention to the controversy and seemed little concerned over the situation, installing what was then considered ridiculous protection, which, by the way, is very close to the protection which is now admitted as a standard, and by so doing saved enormous amounts of money, while the American Telephone & Telegraph Company because of the disturbances to its old grounded circuits, which were vastly more marked than in the case of the telegraph companies, became very much frightened and installed numerous types of elaborate screens intended to keep the high-tension wires off its circuits in case of failure. Notwithstanding this elaborate construction, I doubt whether this company's accidents were as few as those of the Western Union Telegraph Company. The American Telephone & Telegraph Company had little success in persuading any of the transmission companies to install its particular form of construction. The railroads, fearing all sorts of troubles, insisted upon, and were in a position to demand and obtain, practically any form of protection they desired, where high-potential lines crossed their private rights-of-way. The usual form of these protected crossings was an inclosed structural-steel bridge through which the wires had to pass. Because of the enormous cost of this construction, an agitation was started in the earlier days of the high-tension transmission line in an endeavor to secure rational treatment.

JOINT ACTION

This unreasonable demand on the part of the railroad companies, together with the numerous conflicts in the various parts of the country between high-potential and low-potential interests, was the real factor which led to the appointment of a joint crossing committee on overhead line construction. This committee was made up of representatives from the National Electric Light Association, American Institute of Electrical Engineers, American Electric Railway Association, Association of Railway Telegraph Superintendents and American Railway Engineering & Maintenance of Way Association.

About the time this committee was appointed R. D. Coombs presented before the American Society of Civil Engineers a paper entitled "Overhead Construction for High-Tension Electric Traction or Transmission," in which he submitted a specification the principal idea of which was that crossings should be treated as engineering structures and should be designed with sufficient strength to insure that they would stand up under adverse conditions, instead of following the previous ridiculous plan of building the crossing and then assuming that it was bound to fall and building something underneath to catch it. The theory advanced by Mr. Coombs was well received by practically all of the interests, including the railroad, telegraph, telephone and transmission companies. A number of individual specifications were almost immediately issued, and a year or two later the various associations and larger interests working on the question were represented in a joint committee headed by Farley Osgood. In the main the work of this committee has been well received. The report has been adopted by some of the organizations involved, but is still under consideration by others. I believe the National Electric Light Association has not as yet accepted it, and it has not been accepted by the American Electric Railway Association nor by the American Railway Engineering Association. It has been accepted by the American Institute of Electrical Engineers and by the Association of Railway Telegraph Superintendents and, with a slight modification, by the American Railway Engineering Association, formerly the American Railway Engineering & Maintenance of Way Association. It has also been adopted, as a specification for crossings, by the Postal Telegraph, Western Union Telegraph and American Telephone & Telegraph companies.

It must be admitted that the work of this joint committee on crossings is unquestionably of great value, and while there may be some details in the specification or reports as submitted by the committee which should be altered, it provides a common ground and a substantial basis for the adjustment of any differences existing between the high-potential and low-potential interests in this matter.

On the same general working basis—namely, that of treating power lines as engineering structures capable of being designed and built with sufficient strength to insure their standing up under adverse conditions—it is reason-

able to believe that a joint committee could draw up some standard specification which would at least serve as a basis for the high-potential and low-potential interests adjusting any differences which may arise due to the construction of parallel lines and the joint use of poles.

HIGH-TENSION LINES ON HIGHWAYS

Power companies have very wisely avoided using public highways for the construction of extremely high-voltage transmission lines. However, many lines have been constructed on public highways having voltages of 22,000 and even 33,000 volts, and I believe there would be no reasonable objection to the construction of lines of these voltages over the country public highways, provided that the conditions permit of such construction and a reasonable factor of safety is allowed in the use of all materials, and that the spans do not exceed 100 ft. I do not advocate a general practice of constructing lines of these voltages at random over public highways. I believe, however, that where the local conditions make it necessary to occupy portions of a country highway, or even the streets of a moderate size town, it is rational and possible to build a safe transmission line as suggested.

FIRE UNDERWRITERS' CODE

The National Board of Fire Underwriters has published in its Code Book, under Sections B and C of Rule 13, entitled "Constant Potential Power Lines for 5000 Volts," the following rule:

"B.—Such lines should not approach other pole lines nearer than a distance equal to the height of the taller pole line, and such lines should not be on the same poles with other wires, except that signaling wires used by the company operating the high-pressure system and which do not enter property other than that owned or occupied by such property may be carried over the same poles.

"C.—Where such lines must necessarily be carried nearer to other pole lines than is specified in Section B above, or where they must necessarily be carried on the same poles with other wires, extra precautions to reduce the liability of a breakdown to a minimum must be taken, such as the use of wires of ample mechanical strength, widely spaced cross-arms, short spans, double or extra heavy cross-arms, extra heavy pins, insulators, and poles thoroughly supported. If carried on the same pole with other wires, the high-pressure wires must be carried at least 3 ft. above the other wires."

It should be noted that Section C practically repudiates Section B, admitting that it is possible to construct lines in close proximity which, under normal conditions, will not be regarded as unusual hazards. Generally speaking, all interests are unquestionably in favor of safe construction, but it is evident that all have not decided upon, or at least have not arrived at that point where they can decide the question as to what constitutes, safe construction. The foregoing rule is a fair example of some of the hysterical clauses which punctuate the Fire Underwriters' Code and is also a fair example of some of the ideas of safe construction as held by the low-potential interests. The greatest exponent of such construction is the Western Union Telegraph Company, representing in most of its actions along this line the American Telephone & Telegraph Company. The telegraph companies were so long in the field with the light construction necessary to carry their low-tension wires that when modern development made necessary the erection and operation of high-tension wires they were of the opinion that the expense of all adjustments needed to operate harmoniously both kinds of lines in the same vicinity must be borne by the newcomer, and they be permitted to proceed in the even tenor of their ways. Their efforts in the courts to bring about these results have signally failed, and they have recently, by a new method of attack before the public service commissions, as "public benefactors," endeavored to bring about that which the courts have declared was not their right.

PRESENT SITUATION

Now, my reason for calling your attention to the necessity of taking some definite steps toward protecting the rights of high-potential interests, or in reaching a reasonable understanding with the low-potential interests through the action of a joint committee, is as follows:

In the construction of the many miles of interurban lines in this country it has been necessary in many instances to build transmission lines ranging from 11,000 volts to 33,000 volts parallel and adjacent to telephone and telegraph lines. Both have generally occupied public highways, both reaching the same places by the same routes. Then, again, in many instances where it has been found necessary to build transmission lines over private rights-of-way those whose lands are crossed invariably insist that the lines be grouped, so to speak, with any existing line or lines which may already cross the same land or run adjacent thereto in the same direction, cutting the property in one, instead of several locations, and thus minimizing the danger and burden as much as possible.

Many of the larger electric railway lighting and power companies throughout the country represent a consolidation of a number of smaller properties, each of which in the beginning had its own power system which is still being operated as an individual unit entirely separated and isolated as regards conjunctive and parallel operation with the other power equipment of the same property.

The interurban electric railways in particular have developed the outlying districts through which they operate, increased land values and otherwise changed in many ways the customs of the communities they serve. With the development of the country served has come a necessity for an increase in service and a consequent increased demand for additional transportation facilities. In the meantime the original power equipment has deteriorated and become obsolete and radical improvements have been made in the methods of power generation and distribution. It naturally follows that a time comes when a radical change must be made in the power system of the property, and the most economical and efficient methods are usually followed in the revamping. This generally means the elimination of the smaller generating stations and the construction of one or more larger generating stations, or the purchasing of power from some other company, together with the construction of a system of transmission lines to carry the power to the most advantageous points. Alterations of this nature are being made from time to time and will continue to be made as necessity demands. The location and construction of the power station is generally an easy problem as compared with that of locating and constructing the necessary transmission lines. I am sure that no company in revamping its power system would intentionally create an abnormal hazard in the construction of a transmission line. There have no doubt, however, been constructed in some parts of the country transmission lines which were not in accordance with the best engineering practice. I believe, however, that where a line is built consistently with good engineering practice and located at a reasonably safe distance from a low-potential line the company building such transmission line should certainly be free from the unwarranted attacks of an irrational interest, such as the telegraph companies.

THE PAINESVILLE CASE

The Western Union Telegraph Company and its sponsor, the American Telephone & Telegraph Company, having failed in their legal attacks on the transmission companies on the grounds of electrical disturbances to their lines have recently renewed these attacks on the grounds of public safety.

A concrete example of an instances of this kind is set forth in an action brought by the Western Union Telegraph Company against the Cleveland, Painesville & Eastern Railroad Company before the Public Utilities Com-

mission of Ohio, in which the telegraph company asks that the Public Service Commission, on the grounds of public safety, order the traction company to seek a new location for an 11-mile transmission line which has been constructed parallel to the Lake Shore & Michigan Southern right-of-way between Painesville and Willoughby, Ohio.* In the complaint which the telegraph company has filed before the Public Utilities Commission it stated that the line was not built consistently with good engineering practice and that, owing to the many probable (though as shown before the commission highly improbable) failures of the line, it was an extreme hazard which should be eliminated by an order to rebuilt the line in a new location. It might be well to state that the transmission line in question was built on a private right-of-way in the form of pole easements secured from various property owners over whose land the line passed. This right-of-way provided for the setting of poles 3 ft. from the property line of the Lake Shore & Michigan Southern Railway. The shortest poles used were 40 ft. in length, having 7-in. tops, which carried wires from 6 ft. to 10 ft. above and 6 ft. to 15 ft. at one side of the telegraph company's wires. The wires were run flat, that is, all carried on one cross-arm, being wholly over the right-of-way purchased by the traction company. The voltage of the line will ultimately be 22,000. The insulators used are for a normal operation of 27,000 volts and are carried on steel pins having wood tops. The line was thoroughly guyed at all turning points and storm-guyed every ten poles. Three No. 3 hard-drawn copper wires, one No. 6 galvanized-iron ground wire carried some 24 in. above the transmission wires and two telephone wires carried about 10 ft. below the transmission wires represent the loading on the poles, which are spaced 120 ft. on centers.

In the presentation of the case before the commission the telegraph company's witnesses generally admitted that, contrary to its complaint, the line was built consistently with good engineering practice and that the many ludicrous and ridiculous possible failures of the line as set up in the complaint and witnesses' testimony, due to the action of the elements and other causes, were shown to be highly improbable. Among the ridiculous possible failures of the transmission line as set up by the defendant in the presentation of its case were that the wind might blow the top of a box car of a passing train into the wires of the transmission line, and the transmission wire might break at one of the poles and be whipped out like a string into the wires of the telegraph company, that a train might jump the track and plow into the transmission line, etc. It was also alleged that a sleet storm might blow the line into the telegraph line. As a matter of fact it was shown that the strength of the transmission line was in excess of any stress that could come upon it short of a complete cataclysm; in fact, it was a little bit stronger than is required under the specifications drawn by the overhead committee of the American Electric Railway Engineering Association. These specifications are supposed to represent the extreme condition of sleet and high winds, which as a matter of fact has never been met. On the other hand, long before a storm had reached the magnitude necessary to destroy the transmission line the telegraph company's lines would have been laid flat on the railway company's right-of-way.

As to the question of proximity and alleged hazard existing therefrom, it would be just as reasonable to require a railroad company having a double track to separate these tracks to such an extent as to make impossible collisions of two passing trains traveling in opposite directions in the event that one or the other jumped the track in a direction which would carry it to the other track.

Viewed from a legal standpoint, and I quote at random and in a general way from the brief prepared by the Cleveland, Painesville & Eastern Railroad Company's attorneys, public service commissions are created to regulate the acts of corporations in so far as they affect the general public, and in this particular case the Western Union Telegraph Company, acknowledging this status, appears in the remarkable role of guardian to the public interest. Hitherto there has been a suspicion that it was engaged, with reasonable diligence at least, in the promotion of its own interests and had not entered the field as special guardian to the public welfare. To those who have been familiar with the long, bitter fight waged by this company and its allied interests against the use of electrical currents of high potential, which with the progress of modern electrical science have been found necessary to the business of the community, the present attitude of these companies seems due rather to inability to establish their former claims than to a purely unselfish desire for the public good.

POWERS OF PUBLIC SERVICE COMMISSIONS

The statutes of all states give public service corporations certain defined rights and powers. Outside and beyond the rights and powers thus granted the only rule of law affecting the general operation of such utilities is that of reasonableness. Obviously the field covered by this general phrase is of broad extent. Their lines must be reasonably constructed and maintained; reasonable facilities must be granted to the public; reasonable safety must be had in their operation; reasonable charges and tolls may be received, etc. The effort to regulate and determine all these questions of reasonableness in the courts has proved unsuccessful, and there have therefore been created by the legislatures of various states commissions with ample and broad general powers throughout this field to review, determine and regulate in the public interests all these indefinite and undefined matters affected by the question of reasonableness.

There is no question that the establishment of these commissions and their work are of inestimable value to the public. The laws creating the public service commission of Ohio clearly state that the commission can order regulations, practices, rules and services to be installed and observed for efficient, adequate and reasonable transactions of the companies' business, and it may order reasonable repairs, improvements and additions necessary to adequate service and to the convenience, welfare and safety of the public and the companies' employees, all of which is subject to the proviso that nothing shall be so construed as to give the commission power to make any order requiring performances of any act or the doing of anything which is unjust or unreasonable or in violation of any law of the State or of the United States.

In general, the law confers upon a corporation itself power to determine where its lines shall be run and to acquire a right-of-way therefor and to construct and build thereon, and reserves to the commission the power to supervise and regulate the character and safety of its construction and maintenances and the manner in which it deals with the public. In view of all this it would not seem that the commission of any state could lawfully have powers granted to it sufficient to order the removal of a transmission line to a new location when the same is actually constructed within the rights conferred upon a corporation or individual by the laws of a state.

There can be no such thing as absolute safety in any of the modern agencies by which transportation and commerce of the country are carried on. If absolute safety and absolute freedom from danger were the tests, we should have no railroads, no electric lines, no use of steam, no use of electric lighting. A railroad, obviously, cannot be operated without constant danger and risk. The same is true of water traffic. In general, I believe that safety as interpreted by most public utilities does not mean absolute

*See also article on page 963 of the ELECTRIC RAILWAY JOURNAL for June 8, 1912, for a report of this case.

freedom from danger and does not require exemption from these dangers and hazards which are incident to the use of these great agencies of transportation. For if this ruling is contended all progress must stop. The needs of society require that so much of safety must be surrendered by the individual as is essential to the free and uninterrupted use of the best means of transportation from time to time developed. The only test is the reasonableness of the danger or hazard involved, in view of the purposes accomplished and the benefit to the public of the use of these modern agencies of transportation. There must be no requirements that would put the cost of construction or operation beyond the point at which it is commercially practicable to incur such cost. Requirements beyond this point deprive the public of the convenience to which it is entitled. If the rulings sought by the telegraph companies in their various suits in different part of the country are upheld by the courts, the electrification of steam roads, which is now a subject uppermost in the public mind, would become improbable—in fact, impossible—for the high-tension lines needed could not be maintained, because telegraph and telephone lines now occupy the same right-of-way and, as is generally known, the putting of high-potential lines underground is impracticable. I believe that in matters of this kind the law in general requires only such precautions to be taken as are suitable and sufficient under ordinary conditions and not the anticipation of extraordinary or unprecedented things. If a transmission line is constructed so as to obviate every element of probable danger, it is safe within the meaning of the law.

PRESENT LINES SAFE

It is a generally conceded fact that high-potential lines as they are constructed to-day withstand the action of the elements and have far fewer failures in breakages than low-potential lines. It is not so much from the fear of high-potential lines that the telegraph companies are renewing their attacks through other channels and on other grounds, but more to obtain protection against disturbances which they experience when these lines are built in close proximity to theirs. There are hundreds of miles of telephone and telegraph lines operating on joint poles in various cities of the United States and on the country highways, and there are many miles of parallel construction. For the most part, this has been forced on the high-potential and low-potential companies through local conditions and in many instances to avoid nuisances by the duplication of pole lines on public highways. There may be considerable faulty joint and parallel construction, and I certainly do not advocate the continuance of this practice. It is a fact, however, that the great majority of these lines stand and are operated day after day, month after month and year after year, and no damage results therefrom. This is the best possible evidence that there is no particular hazard and danger in such construction.

In the eyes of the law there is no question as to the rights of the interests involved in these line controversies, for so long as any company is free from negligence it has the right to use whatever form of electric current is deemed most advantageous, and no company has a monopoly to use a public highway or the atmosphere surrounding it to the exclusion of all others. Recognizing the rights of all, with the immense amount of fact and information we have as to the materials entering into the construction of all forms of electric lines, and treating the construction of these lines as engineering structures, it is certainly possible for the high-potential and low-potential interests to meet on a common ground and adjust their differences without resorting to legal actions. A joint committee keeping these points in mind can unquestionably provide a standard acceptable in a general way to all.

The work of this joint committee should cover the entire field of line construction. All interests should be represented, and when the work is finished each interest should be satisfied that the specification calls for good construction in every branch of the work, telegraph as well as transmission. If such is the case, the various interests should be ready to accept any line built in accordance with the standard specifications, with such modifications as may be needed to meet any special local conditions. It will not be possible to draw a specification which will cover the details of every situation.

However, if we cannot secure from the low-potential interests, that is, the telegraph and telephone companies, the rational consideration to which we are entitled, let us keep up the fight as one body and force them to recognize our rights as we have as individuals in the past.

M. C. B. REPORT ON TEST OF BRAKESHOES

The standing committee on brakeshoes of the Master Car Builders' Association recommended at the June convention held at Atlantic City that this year's program should include tests on brakeshoes at a speed of 65 m.p.h. and at pressures of 10,000 lb., 14,000 lb., 16,000 lb. and 18,000 lb. The pressure of 20,000 lb. is not included, as the results obtained last year showed that no practical advantage attended the use of a pressure higher than 18,000 lb. The committee also recommended certain changes in brakebeam and brakebeam gage, width of slots in brakehead, numbering of brakebeams, etc. It submitted a new M.C.B. sheet No. 17, which contains a standard brakehead, shoe, key and gages for same in accordance with the last ballot of the association; new sheet No. 17a, containing the standard brakebeam, brakebeam gage pin, wheel gage and standard limiting outlines for brakebeams, and new sheet No. 17b, which shows a proposed No. 2 standard brakebeam with details. Another interesting feature of the report was a table of deflection tests on two types of brakebeams and views of the brakebeams before and after the tests.

PROPOSED CHANGES IN M. C. B. STANDARDS

At the June convention of the Master Car Builders' Association held at Atlantic City, N. J., the committee on revisions of standards and recommended practice made the following recommendations among others, in accordance with suggestions which had been offered to it by makers and users:

That the wedges for 5-in. x 9-in. and 5½-in. x 10-in. journal boxes be changed as shown in its sketch (not reproduced) to provide for increased end-bearing surface against stop lugs.

That changes in the areas of the equalizer seats of passenger pedestal journal boxes to bring about greater consistency be referred to the committee on car trucks.

That the mouth of 5-in. x 9-in. passenger journal boxes should conform to that of the 5-in. x 9-in. freight boxes.

That the journal bearing and wedge gages be made heavier.

That the removal of certain inconsistencies in freight and passenger journal box design, so far as the M.C.B. standard dust guards, dust guard slots and the holes in the dust guard walls are concerned, be referred to the committee on car trucks.

That the inaccuracies in the dimensions of the wheel check gage on page 525, sheet M.C.B. 16, be corrected.

That a proposal to amend the specifications for M.C.B. couplers to admit as an M. C. B. standard couplers which have an underneath coupling arrangement be referred to the coupler committee.

That the signal lamp sockets be placed at an angle of 45 deg. located on the corner post and approximately 9 ft. 6 in. from the rail to the bottom of the slots of the socket.

That the government standard of 8-in. x 10½-in. be used for specifications and letterhead paper.

Papers at Central Electric Accountants' Association

Abstracts of the Papers on Accounting for Capital Expenditures and Method of Settlement for Interline Accounts

ACCOUNTING FOR CAPITAL EXPENDITURES

BY B. E. BRAMBLE, GENERAL AUDITOR ILLINOIS TRACTION SYSTEM

To the average railroad accountant the capital expenditures and entries pertaining to capital accounts might be divided into three periods: The original or building period, which is prior to the operation of the lines; the betterment, extension and improvement period, which is more or less active during the time the road is in operation and being developed; the third period, which is brought about through insolvency or sale of property to other corporations, thus bringing about the liquidation of the affairs of the company. The last of these three periods is not often encountered and experience among most of the railroad accountants has not led to these extreme conditions and entries.

RIGHT-OF-WAY AND CONSTRUCTION ACCOUNTS

The company which has been supplied with money to construct the road must necessarily first obtain its franchises, an expense which is usually small in the aggregate. Second, it is necessary to obtain right-of-way options, it being advantageous to secure several routes that might be used between the intended termini in order to evade condemnation suits and paying exorbitant prices for right-of-way. Contracts for grading and for all material and equipment necessary in the operation of the road must be entered into in ample time for their completion and delivery. The accounting for these capital expenditures is not complicated and does not require much detail, and with any reasonable classification of construction accounts the expenditures can be handled through a simple voucher register and ledger.

After the decision is made as to the route, the engineering department should supply the accounting department with blueprints of the right-of-way, and a right-of-way ledger should be opened showing each parcel that is purchased and consecutive numbers should be given to them. This record should be handled alphabetically, with references to the blueprint for location. The index book itself should not only show the parcel but as well the consideration of the option and its date and should have a column for the cash consideration paid, which should be subdivided into crop and other damages and abstracting and recording fees, salaries, commissions, etc.

The establishment of storerooms or houses at intervals is a necessity toward proper accounting for material purchased, as is also a storekeeper with customary in and out records. Smaller material, such as spikes and bolts, should be charged to a stock account and credited out monthly or weekly upon the certified reports of the storekeeper. This same procedure could be used nicely for the larger materials, such as wire, ties, rails, etc., so that at the completion of the road, or rather at the time it is turned over to the operating department, any surplus material could be transferred to the general stores account and used in the future for either maintenance or construction. Petty memorandum books covering the various contracts for power house equipment, building and installation are very necessary, as is also a petty account with the graders to whom the sub-contracting is let.

RENEWALS AND REPLACEMENTS

The portion of capital expenditures that is confronting most of us at the present time is the improvements to our present operating companies, which, if carried to the extreme, can be made very complicated. There are heavy renewals and replacements that cannot be termed current or monthly maintenance. Thus 54-lb. rail may be replaced by 70-lb. rail and the smaller and partly worn rail used for extension of sidings. This, of course, is an improvement to the property from an earning point of view, and the additional cost of the heavier rail is a marked improvement to the older property. We renew worn-out ties that were purchased several years ago at a nominal price by creosoted ties that cost more than double the ones supplanted. The additional amount expended over the original cost should be charged to the construction or property improvement. Most of the more up-to-date companies are working their annual construction on authorized appropriations granted by the directors. These show each job, to which a number is given, and for which the treasurer of the company must necessarily provide the cash, either from the sale of securities or from available surplus cash. These jobs are completed by the different departments' distributions or on pay rolls, and material is debited against the job number in one auxiliary ledger and against the account number, in accordance with their method of classification, in another ledger.

After these appropriations were made for several years their incompleteness became evident because of the continual argument between the different departments as to what might be termed a construction job and what might be termed a maintenance job. Finally it was decided that the directors should make all appropriations for heavy replacements as well as for extensions and new additions to the property, each appropriation on the list appearing in a column headed "replacements" or in the column designated "construction." In most instances the original books reveal the cost. It involved very little expense to get the different departments and the outside engineers to make estimates as to the original cost of some property that was to be replaced, and the purchasing department furnished the estimated cost of the new material, the amount being placed in the construction column only in so far as it exceeded the estimated cost of the older property. In the replacement column appeared the original cost of the property that is being renewed. Any salvage received from the sale of the older property after it was taken out was credited to the replacement account. For example: If a concrete culvert is built to take the place of a small pile trestle the engineers can arrive at the appraisal with very little difficulty.

In making this separation the bookkeeper has to open up another petty ledger for the replacement jobs and a ledger for the replacement classification, and in most cases when a job involves both the construction and replacement account it is necessary to prorate on a percentage basis the total expenditures against the job at the end of the month between the replacement and the construction accounts until the job is completed. Engineers or heads of departments who ask for the appropriations are presumed to keep within the amount authorized, which in most cases is within their estimate. Floods, strikes and similar events are excuses for exceeding the amount authorized.

After the completion of any job that is chargeable to replacement and to new construction any expenditure over the appropriation authorized is chargeable against the construction portions of the job. The original estimate on the replacement portions of the job must be covered, but not exceeded.

RESERVE FOR REPLACEMENTS

The companies undertaking this procedure were con-

fronted with the proper basis upon which to create a reserve fund to offset their debits against their replacement accounts. There was also the problem as to what their cash surplus would permit. If these reserves are based on a percentage of the gross earnings, entries could be made each month, debiting profit and loss suspense account and crediting replacement reserve account, the former being deducted from the earnings at the end of the year and the latter being applied against the replacement charges. Companies whose surplus did not warrant a charge equal to their replacement requirements had necessarily to provide their funds from the shareholders by the creation of a floating debt, in order to have the cash available for the payments brought about by the charges for the renewals. In most cases the amount spent for construction was funded through the issuance of escrow bonds, and thus the company was reimbursed for money expended. A fair separation of betterments between the construction and the replacement accounts leads to good recommendations by public accountants for the issuance of construction bonds and in no way tends to jeopardize the treasurer of the company when he certifies to the trustee for expenditures that are questionable, if their propriety is doubted by the bondholders or trustee.

This replacement method improves the arbitrary depreciation entries that a great many companies try to write off at the end of the year against their surplus, it being the intention to take care annually of the upkeep by replacing worn-out property instead of by assuming that in the aggregate the depreciation has been an arbitrary amount. Most interurban companies have found that practically all of their petty replacements are nicely taken care of out of their current or monthly maintenance charges. In some years the appropriations for the betterments will be very small, and the company should lay aside a monthly reserve exceeding its current requirements so as not to burden the coming year, if larger replacements are anticipated. Thus it would carry over a balance which would be deducted from the next year's requirement before the monthly entry is computed.

Companies which have used this plan have really found themselves confronted with but one proposition, that is, the feature of obsolescence. While in the electric transportation business from its infancy, we have witnessed only petty features of obsolescence. There probably will be a time when such large apparatus as turbines, substation equipment and all of our present motor car equipment will be obsolete, or the storage battery or some other method will allow us to dispense with our heavy investment in overhead construction. While it is uncertain what attitude the coming state commissions will take in reference to large replacements of this nature, no doubt most of them would be liberal enough to permit these expenditures to be capitalized like previous evolutions of this nature, such as the electrification of the old horse car and cable properties. This condition is very uncertain and may be brought about through a period of a great many years and in a great many different ways. No doubt it would be wiser not to endeavor to anticipate any amounts to cover such expenditures.

BOND DISCOUNTS

Most of the bonds withdrawn for betterments have to be sold at a discount. While the time is fast approaching when the public investor will be willing to pay par for these securities, a great many of the accountants are confronted with the problem of handling discounts on blocks of securities disposed of. It has been found and recommended by expert accountants that a portion of this discount should be deducted from the surplus at the end of each year, spreading it over the life of the bonds; that is, if there was a discount on bonds that had twenty years to run, it should be held in an open account and one-twentieth charged against the surplus at the end of each year.

RECEIVERSHIP ACCOUNTS

Coming to the third period of capital accounting, as referred to at the beginning of this paper, so far as companies thrown into the hands of a receiver are concerned, their books and accounts must be closed in accordance with settlements and instructions outlined by the courts.

CONSOLIDATIONS

However, most of us have passed through stages of consolidations or mergers, or even the outright sale of the physical properties to other corporations. In a consolidation the company usually receives stock or bonds for the present par valuation of its corporate liabilities. The new company taking over the property as a going concern accepts all contracts and liabilities and receives all movable assets, as well as the real estate and equipment. In the liquidation of the affairs of an old company in this instance the proceeds either in stock or bonds or notes pass to the old holders of stock and bonds par for par. In the outright sale of a property to another corporation many strange entries and phases of accounting confront the bookkeeper. There is often cash and accounts receivable withheld, as well as current liabilities. The latter debts must all be liquidated before the balance of the proceeds can be turned over to the shareholders, and this division of assets to the shareholders often is made in stock or scrip.

Upon the delivery of the deed to a new company the accountant should lift his book property account balance into a sale account, compute the consideration of the sale and pass this amount to the credit of this new account, debiting an account which might be termed "proceeds of sale." All losses or gains in the settlement of current accounts are also put in this liquidating account to bring about the final entry of distribution, which would read: Debit "property sale" account, debit "capital stock" account and credit "proceeds of sale" account. The distribution of proceeds to the shareholders should bring about their cancellation and return of their old stock certificates and a written acknowledgment of the payment made to them. As in all important entries, the closing ones should be ratified by the directors to eliminate any future responsibility, not only to the treasurer but to the bookkeeper and accountant as well.

A METHOD OF SETTLEMENT FOR INTERLINE ACCOUNTS

BY F. T. LOFTUS, AUDITOR INDIANAPOLIS & CINCINNATI TRACTION COMPANY

The method of settlement of interline accounts has been a much discussed subject, and although the majority of companies represented by this association prefer the draft method, numerous others, particularly among the small companies, still hold fast to the check method.

It is not the purpose of this paper to discuss the merits of either method, but to suggest a plan of handling interline accounts from the compilation of the reports until the settlement of the account is made, either by balance or by totals, so that any ordinary clerk can be trusted to carry out the instructions.

The different reports making up interline accounts will be taken up in the order generally followed in issuing reports. The report forms to which reference is made are either Central Electric Accounting Conference or Central Electric Railway Accountants' Association forms.

INTERLINE TICKETS

The agents' monthly reports of interline tickets sold are checked against the audit stubs and then against the coupons lifted on the trains. The agents' reports, if found correct or as corrected, are then used in making up the statement to foreign roads; the tickets are entered by selling stations to destinations, in the numerical order in which they are sold, showing opening and closing numbers, number sold,

rate, foreign road's proportion and total due foreign road.

Another plan, which is used on several roads, is to make up the statement directly from the audit stubs after they have been checked against the ticket report. Where a great many interline tickets are sold the first plan is undoubtedly the better, as the foreign road's proportion can be worked out on the ticket report, which in most cases already shows the local road's proportion as made out by the agent.

CENTRAL ELECTRIC TRAFFIC ASSOCIATION MILEAGE

Central Electric Traffic Association mileage lifted on the trains is accumulated by the train checking clerk and turned over to the ticket accountant, by whom it is sorted, first by road numbers and then by book numbers, and later is filed in envelopes under the names of the various foreign roads. Immediately after the conductors' reports for the last day of the month are checked and all lifted mileage is filed, a statement is made for each road whose mileage has been honored, showing the opening and closing numbers of each detachment of mileage, in its numerical order under book numbers. A recapitulation of the totals of each column is then made, and the difference between the total opening and closing numbers is the amount to be charged to the foreign road at the rate per mile specified by the Central Electric Traffic Association.

INTERLINE BAGGAGE

Audit stubs of all baggage checks issued are sent in daily with agents' remittance letters. Before they are filed a memorandum list of all checks forwarded to foreign points is made up for each road. The agents' monthly reports are checked against this list, and if correct, the statement of checks forwarded is then abstracted on a special form.

A similar list is made of all foreign checks lifted on our road and is used in auditing the foreign road's report.

INTERLINE FREIGHT

The audit copies of all foreign waybills received are checked daily against the junction agent's passing record and then filed by the names of the issuing roads. If the passing record shows any shipments passing for which we do not have an audit copy of the waybill, the passing record is held open for two days, and if the waybill has not then been received a tracer is sent to the foreign company auditor for a copy.

The agents' monthly reports of waybills received are checked against the audit copies, and if they are found to agree the statement is made up to the foreign company directly from the audit copies, as follows: The waybills are abstracted on a form under the name of the forwarding stations to the receiving stations, in order of date, and each station is totaled separately. The total of each station is then carried to the division of revenue sheet and the proportion due each road over which shipments have passed is shown on the statement; each road's proportion is derived from percentage sheets accompanying the interline tariffs. A recapitulation is made of the division statements on a form and the total of the percentage due that road is entered in the credit column of the statement. If the road is an intermediate carrier, the proportions due to it for shipments passing over its line are also shown in the credit column.

All prepayments on shipments are debited against the originating road, and after any accepted corrections have been entered the columns are totaled and the balance is shown there for or against the originating company named on the report. A copy of each abstract and division of revenue statement is sent to each intermediate company over whose road the shipments passed, so that its proportion of revenue may be audited with its records. Reports from foreign roads are checked against the agents' monthly reports of freight forwarded, and against the junction agents' passing record, for the proper entry of waybills; afterward the percentage and extensions are checked.

MAILING REPORTS

The reports of mileage honored should be mailed on or before the fifth day and the reports of tickets, baggage and freight on or before the fifteenth day of the following month, as specified in the agreements of this association. A carbon or impression press copy of each report should be retained for office record.

ENTRIES ON BOOKS

After all reports are issued and foreign reports audited, the items are carried to the books. One plan which is used by a great number of roads is to make a journal voucher, showing the various revenue accounts, suspense accounts, etc., and the foreign roads debited or credited. Another plan which has been found to work successfully with a number of smaller roads is to make the entry in the journal directly from the reports without making any voucher whatever. The plan having been decided upon, the entries should be made as follows:

TICKETS

First—From our ticket reports to foreign roads charge the ticket suspense, or ticket liability, account with all interline ticket sales and credit foreign roads therefor.

Second—From their ticket reports to us charge foreign roads and credit ticket suspense account.

These two entries would usually be made by the use of the conductors' return of tickets in a daily actual earnings system, but where the road makes only a daily estimate of earnings and has no actual earnings system the passenger revenue accounts would be credited directly from these reports instead of the ticket suspense or any controlling account.

CENTRAL ELECTRIC TRAFFIC ASSOCIATION MILEAGE

As the Interstate Commerce Commission says that a mileage suspense account must be carried and only lifted mileage carried to the earnings account, the reports of mileage honored by this company are credited to the mileage suspense account and foreign roads are debited.

Charge mileage suspense account and credit foreign roads for our mileage lifted by them, per their reports to us.

BAGGAGE

Charge foreign roads for our proportion of interline baggage forwarded prepaid or received-collect by them and credit baggage revenue. Credit foreign roads for their proportion of baggage forwarded prepaid or received-collect by us.

FREIGHT

Charge foreign roads for all interline freight and credit freight revenue when the balance is in our favor.

Credit foreign roads and charge freight revenue when the balance is in the favor of the foreign road.

The journal voucher entry (or direct journal entry, if voucher is not used) having been made, and the items of tickets, mileage, baggage, freight and foreign companies posted to their proper accounts in either the general ledger or in an auxiliary ledger, the balance is then made.

DRAFT SETTLEMENT

When the balance is due the foreign road several different plans for settlement by draft may be followed. First, a voucher check may be made payable to the treasurer of the company, to the auditor or directly to the bank, reading "For payment of interline balances, subject to draft, as per companies listed." A second plan is to pay each draft as presented by voucher check or petty cash directly to the bank. Another plan is to pay drafts as presented to the auditor by the bank and enter a personal expense account.

The company in whose favor a balance is due makes up a statement to various foreign roads and should write drafts at the same time. The statement should be mailed at once. Deposit drafts for collection at the local bank on the twenty-fifth day of the month, and when notified of payment deposit cash with the treasurer or in the bank to the treasurer's account. Another plan would be to deposit the drafts in bank as cash and treat them as such on the bank account. If the drafts are not honored, make a refund to the bank through voucher or petty cash check.

Papers at Seattle Convention of N. E. L. A.

This Convention Was Held at Seattle June 10-14, 1912—Abstracts of the Papers and Reports of Especial Interest to Electric Railway Companies Are Presented—A Short Abstract of the Proceedings at Seattle Is Also Published

GENERAL, EXECUTIVE AND PUBLIC POLICY SESSIONS

REPORT OF PUBLIC POLICY COMMITTEE.

The report of the public policy committee as usual was a feature of the convention. This committee consists of fourteen members, with Arthur Williams, New York Edison Company, as chairman. Among other members of the committee are: H. M. Byllesby, Henry L. Doherty, Charles L. Edgar, W. W. Freeman, General George H. Harries, Samuel Insull and Charles A. Stone.

After referring to the report of the committee last year, which was presented by Samuel Insull and was followed by an address by Secretary Nagle of the Department of Commerce and Labor, the report says in part:

"It must be apparent to even the unobservant that a serious state of growing unrest exists throughout the industrial world. Reference to this condition was made in earlier reports, since when it has not diminished. Rather has it grown in intensity, and it now spreads over a wider area of industry. Our own country is perhaps more fortunately situated than others at the moment, yet there exists a present and growing state of unrest and dissatisfaction. The most recent expression of this reaches us through the enormous increase of the socialistic vote—a vote meaning, in our judgment, a wide-reaching spirit of rebellion against some of our existing social and industrial conditions. The old order is undergoing change—no less real because the result is reached by changing public opinion rather than by physical effort. We urge upon our member companies careful consideration of their standing in the communities they serve; that the utmost care be exercised to eliminate on their part any conditions leading to friction, criticism or a sense of injustice. We urge the adoption of methods by which the communities we serve may realize our own appreciation—too seldom publicly expressed—that we have a public service to perform and our willingness and purpose to perform it in the most enlightened manner. In all our relations, public or private, nothing should be approved which contains the slightest degree of injustice or unfair dealing.

"In our judgment, the interests of the public are best served by giving public utilities, such as our own, a monopoly in the fields they occupy—thereby enhancing the capacity and stability of the generating plants and supplying systems and, through economies obtainable with greater production, eventually rendering service at lower prices. We urge the acceptance of the principle in our membership, and by those engaged in the manufacture of apparatus and equipment, that the establishment of competition operates against, not for, the public good; it tends to destroy existing values and to create new obligations of uncertain stability. With extending and wise legislative control of our utilities, your committee believes that the continued acceptance of the principle of a regulated natural monopoly is beneficial, and not harmful, to the public and to our own interests. Where monopoly of service is granted, a higher degree of responsibility rests upon us to become an important factor in that which makes for the larger and better development of the community in which the service is rendered. If possible, effort toward good service, fair prices and courteous treatment should be greater than where competition is most keen. This is demanded by good faith and no less by good management.

"Criticism has been made that our industry has been without the means of providing accurate and recent information upon which a defense against the advocates of municipal ownership might be effectively maintained. In the opinion of your committee, this criticism has been justified, and it is pleased to report the organization during the year of the Municipal Ownership Publishing Company at 17 East Thirty-eighth Street, New York City. This company will maintain a library, from which the general public, including, of course, our member companies, may quickly obtain the latest available information, from all parts of this country and Europe, on the subject of municipal ownership. In addition, it will issue a monthly publication in reference to the movement and its economic features. The work of the publication company is to be confined largely to providing carefully confirmed facts for the editorial and magazine writers of the country, public officials, our educational agencies and for others who may be interested in the subject.

"It is gratifying to report that, among other movements, during the year 'service annuities' have been adopted by the Commonwealth Edison Company; the employees' savings fund of that company now amounts to $230,000 and owns 2,300 shares of the company's stock, and an interesting feature of the welfare work of that company is the continuation on the payroll, for periods ranging from half a month to six months, of fourteen tuberculous employees, whose wages or salaries during the period of illness amounted to $2,740. The Edison Electric Illuminating Company of Brooklyn has continued its plan of profit sharing, and at the end of 1911 devoted to this purpose $45,674.50, compared with $38,171.03 at the end of 1910. A most important step in general welfare work has been taken during the year by the Edison Electric Illuminating Company of Boston, which has created a special bureau to have entire charge of the general relations of the company to its employees in all matters outside of their regular duties and employment. Naturally, the plans are still in a tentative or formative state, but the intent is an organized effort to make practical application of last year's recommendations of your committee. The Philadelphia Electric Company's beneficial association has paid out $61,000 during the past five years on account of temporary disability, $42,000 in death benefits to the beneficiaries of forty-eight deceased employees, while for the full period of five years the total contributions of the deceased members to the death benefit fund amounted to only $325, or an average of less than $7 per member. There is a surplus in the treasury of $33,000.

"The Cleveland Electric Illuminating Company in eight years has distributed through its employees' fund $136,881.55, of which amount $57,817.40 has been distributed in cash and $79,064.15 remains in the fund to the credit of employees, whose accounts are credited with 4 per cent interest annually. Stone & Webster and H. M. Byllesby & Company have also established investment associations.

"A number of our larger industrial establishments employ a 'safety engineer.' In some the safety features of any new work are carefully checked on the plans before they are passed for final utilization. By increased watchfulness in this respect, one of the largest corporations of the country reported a reduction of 63 per cent in the number of accidents occurring last compared with the preceding year; another reports 61 per cent and still another 50 per cent.

"It is gratifying to know that a very large percentage of the companies reporting have adopted some form of 'welfare' relationship which conforms with the recommendations of last year's report of your committee. Thus, of the 288 companies, 140 now provide free medical and surgical attendance, in the event of industrial illness or acci-

dent, and twenty-eight companies regularly employ physicians or surgeons for their employees; 139 companies continue their employees on the payroll at full pay during full or partial periods of illness; ten member companies now provide service annuities, eight have adopted some form of profit sharing, nineteen have employees' investment or savings fund associations, and a similar number provide life insurance."

The appendices to the report consist of an actuarial analysis of the cost of maintaining various forms of insurance relationship; the decision of the Kansas Public Utilities Commission in refusing an application for a competitive franchise at Parsons, Kan.; the cost of providing industrial accident compensation to its employees and to the general public by the New York Edison Company covering a period of six years, and an engraving showing a service certificate, as adopted by the Consolidated Gas, Electric Light & Power Company of Baltimore.

REPORT OF COMMITTEE ON PROGRESS

In the report of the committee on progress, T. C. Martin, chairman and secretary of the association, gave some interesting figures on the development of the central station industry in this country. These figures, as based upon the *McGraw Electrical Directory* for October, 1911, showed 5769 companies, an increase of 86 over the previous six months. The number of municipal plants was 1372, and of those which carried electrical supplies 3460. The total number of plants, including Canada, Mexico, the West Indies and the Republic of Panama, was 6295, of which number 1516 were owned by municipalities. There were 889 straight d. c. plants, 3997 straight a. c. plants, 783 combination circuit plants, and 1285 stations had hydroelectric machinery in whole or in part. There were 267 plants which supplied steam and 221 which manufactured ice. The United States census report for 1907 showed that the investment in the United States plants was capitalized at about $2,500,000,000 and that the annual earnings were about $350,000,000. The output from 2,221,773 kw generator capacity in 1907 was nearly 6,000,000,000 kw-hr. Both the investment and output had probably doubled since these figures had been compiled. It would not be surprising if the total central station income in the United States to-day was between $364,000,000 and $400,000,000.

EDUCATING CENTRAL STATION EMPLOYEES

H. E. Grant read a paper entitled "Educating Central Station Employees." He said that any scheme of education should also include the women workers. It should be possible for any employee to obtain just the information he required at the time that he needed it. Trade periodicals and annual conventions of the association offered much educational matter, but this material was not thoroughly systematized. Because the initial efforts of some companies had appeared to result in failure they had discontinued their educational work altogether and had lost interest. That interest should be aroused again, for if the work was properly planned and prosecuted educational effort should prove profitable alike to employer and employee. The cost of the necessary experiments was as nothing compared to the losses due to inefficiency and ignorance. Much should be made of the daily, weekly or other periodic experience meetings where those working in the same department can state just what they have accomplished worthy of note. The head of the department should be present to counsel, advise and encourage. There were some, not by any means laymen, who objected to the inference that the education of the employee should be along technical lines only. The New York Edison Company, for instance, now had in mind the inauguration of a distinct course for accountants. Much could be accomplished by the aid of studies planned for each class of employees, while the officials or special inspectors could help the students with the more difficult problems. Examinations, both oral and written, should be included and the bibliography of each subject carefully compiled for study. In order to keep pace with improvements, current articles or new works useful to the different classes of employees should be brought to their attention through the medium of the company's bulletin. In conclusion, some plan of presenting diplomas was suggested for mature consideration. An appendix to the paper contained the various school courses adopted by the New York Edison Company.

TECHNICAL AND TRANSMISSION SESSIONS.

PRIME MOVERS.

A long report of prime movers was presented by Chairman I. E. Moultrop. It was divided into three parts dealing respectively with water, steam and gas power. The use of vertical versus horizontal-shaft waterwheels was discussed at some length. The horizontal-shaft type is preferable in all cases except where the head is so low as to allow insufficient room to guide the water properly to and from the wheel. However, the difficulties with vertical-shaft wheels have recently been reduced to a minimum by the use of roller bearings for supporting the weight of the runner. In discussing governors and speed-limiting devices the committee expressed the opinion that there is still room for considerable improvement. The committee called attention to the benefits of operating steam-driven generating units in parallel with waterwheel units arising from the superior efficiency of governing devices for steam prime movers.

No marked development in steam prime movers has taken place during the past year. The committee discussed at some length the methods of purchasing coal and pointed out the advantages of purchasing on an ash basis. The use of chain-grate stokers was recommended for burning low-grade coal running high in ash and volatile matter, but the use of such grates with fuels which tend to cake or run will probably result in burning the grate bars. This difficulty can be overcome to some extent by installing a water-back just in front of the bridge wall. It is possible to construct mechanical stoking furnaces so that they will be practically smoke-proof after the brick-work becomes heated. Steam-flow meters have not been perfected to a high degree of accuracy under average boiler conditions but are nevertheless accurate to a degree which makes them exceedingly useful. The committee pointed out the desirability of regulating feed-water supply to individual boilers in order to maintain a uniform steaming rate. The fatigue of cast-iron fittings when exposed to superheated steam was emphasized, and the committee strongly advised against the use of such material. Brief reference was made to the new method of burning gaseous fuel which was developed by Professor Bone, of England. This method depends upon the apparently new principle that gas burns more readily when in contact with an incandescent surface than it does in a free flame. It is reported that high efficiencies are obtained by this method. The committee called attention to the extensive use in Europe of high-efficiency reciprocating engines, such as the Locomobile, the Stumpf, Wolf, Lenz and Memming types. In comparatively small sizes these types have attained a steam consumption as low as 16.5 lb. per kw-hr. Brief statements were included from two large manufacturers of steam turbines covering detailed improvements made during the past year. Efforts continue to be made in the direction of securing higher condenser vacuums, and radical changes in design have been made during the past two years with the object of so arranging the tubes and baffling the flow of steam that the entrained air will be swept toward the vacuum pump suction and the steam side of the tubes readily freed of condensation. Substantial improvements have been made in speed reduction gears for steam turbines.

In discussing gas power, the committee dwelt at some length on the available sources of oil for prime mover pur-

poses and touched upon the preparation of specifications for engine fuel oil. It is quite essential to obtain oil that is free from acids, asphaltum and non-combustible solids. In both Germany and the United States gas-house tar has been successfully used in engines of the Diesel type. The superiority of engines of the Diesel type as regards fuel economy has been very well established. The following figures were given for oil consumption with engines of different types: Diesel, 0.5 lb. per brake hp-hr.; De La Vergne, 0.6 lb. per brake hp-hr.; Hornsby-Akroyd, 1 lb. per brake hp-hr. The oil in each case is assumed to contain 18,500 heat units per pound. The committee included a table giving very complete data on thirty-eight oil-engine plants, showing the cost of operation and describing the results obtained. A full summary was presented of the troubles experienced in operating and maintaining twenty-one engines of the Diesel type, in different installations, and sixteen of the De La Vergne type. The committee did not attempt to enter extensively into the subject of gas engines; this was thoroughly discussed in the 1908 proceedings of the association. Coal-gas producers are successfully meeting demands where the load factor is high and fuel relatively expensive. Experimental gas turbines as large as 1000 hp have actually been built and operated, but reliable information in regard to them has not been received by the committee.

ELECTRICAL APPARATUS

The committee on electrical apparatus, L. L. Elden, chairman, presented a comprehensive report on generating station and substation apparatus, intended to be a continuation of the work commenced by the previous committee. The body of the report was very brief, while the principal details were presented in a voluminous illustrated appendix.

The committee directed particular attention to a number of improvements, which are briefly outlined in what follows. The demand for higher economy, particularly in steam turbine operation, has led during the last two years to the adoption of still higher speeds, especially on medium-size and large-size units. In view of the brief experience with such units special care should be given in the preparation of specifications to insure safe and reliable operation, especially in connection with reactance, temperature rise, ventilation and ruggedness. Owing to the progress of development, the committee made no definite recommendations on speed limitations. The committee also pointed out the economic advantages of very large generating stations and extensive networks for distribution, which are becoming better known. Enormous possibilities for progressive central-station companies are opening up along these lines. There is, therefore, an increasingly strong demand for 60-cycle synchronous converters for railway purposes, and the committee strongly urged further improvement in the design and construction of such equipment. The committee was not in favor of adding to the investments in 25-cycle transmission lines and converting apparatus.

Developments during the year indicate a demand for simpler and more rugged switchboard equipment in substations, particularly in small substations which do not have continuous attendance. Iron-clad switch gear is being used abroad to some extent and is being favorably thought of in this country; the committee recommended that it receive careful consideration.

Power-limiting reactances have been successfully installed in a number of cases. Induction generators have not been generally adopted, but several prominent companies, including the Interborough Rapid Transit Company of New York City, have installed and operated them with excellent results. The operation of oil switches has been improved by the modification of the baffles inside the tanks and the strengthening of the insulators and supports. The committee called attention to the possible hazard to employees from instrument transformers and mentioned a case where a man was killed by touching the name plate which was crossed with the primary winding. The committee also recommended that the manufacturers continue their efforts to increase the tube life in mercury-arc rectifiers.

UNDERGROUND CONSTRUCTION

W. L. Abbott presented for the committee on underground construction a very interesting report, divided under four heads, as follows: alternating-current underground distribution, manhole construction, electrolysis and high-tension cable data and specifications. The subject of alternating-current underground distribution was chosen on account of its growing importance, which arises from the tendency of municipalities to eliminate overhead systems in the more thickly settled residential districts. Replies pertaining to this type of underground distribution were received from twelve large operating companies and were grouped in a large table for comparison. The committee particularly emphasized the importance of keeping complete records of subway equipments and the great desirability of maintaining a record of subway troubles. A strong recommendation was also included to make systematic inspections.

The subject of manhole construction was considered on account of its important bearing on underground distribution in general. Manholes are commonly constructed of brick, monolithic concrete or concrete blocks. The manhole practice adopted by eleven large central-station companies was well presented in tabular form. Tables and curves showing manhole costs were included. The subject of high-tension cable data and specifications has not hitherto had due attention and was therefore taken up by the present committee. Data were again collected from the largest central-station companies and presented in tabular form. The working pressures vary from 5500 volts to 25,000 volts, and the total length of cable covered by the reports is 1912 miles. All of this cable, except 69 miles, is paper-insulated and impregnated with compound. A form of standard specification on cables was submitted for consideration.

Probably the most important work done by the committee was in the collection of information relating to electrolysis of sub-surface structures. The committee first sent out a list of nineteen questions to all the member companies in cities having a population above 100,000. Definite and complete replies were received from companies operating in twenty-nine of the principal cities, and these were summarized in tabular form. In only four of the cities are there any municipal regulations prescribing the maximum permissible drop in the track return. No litigation is in progress against the companies in any of these cities, although the preliminary steps have been taken in three instances. The answers in reference to the systems of protection in use indicate that the so-called parallel system is the most popular, while the drainage system is second in preference. Among the lighting companies there is considerable difference of practice in bonding their cables to gas and water pipes and telephone cables. In one instance a railway company has obtained very satisfactory results by disconnecting the rails from the negative busbar and extending insulated negative return feeders for some distance from the station and connecting them to the rail network. Several lighting companies connected the neutrals of their three-wire systems to the rail return, but found that this practice upset the balance in the three-wire system and were forced to discontinue it. The committee observed that there has been a general failure to take up the subject of electrolysis along comprehensive lines in an effort to solve the problem simultaneously for all of the utility companies involved. Among the specific remedies considered were the following: the double-trolley system, the insulated negative return feeder system, the three-wire control system, the parallel circuit system, insulating cable joints, water conduits and the drainage system.

TRANSFORMERS

A comprehensive illustrated paper on the care and operation of transformers was presented by W. M. McConahey. The author pointed out in general that the large high-voltage transformers now coming into general use require a certain amount of care and attention in order to give satisfactory service. The paper dealt mainly with oil-insulated transformers, but referred briefly to the air-blast type. The two primary essentials in transformer design are insulation and heating. Perhaps the most important matter in connection with oil-insulated transformers is that of keeping the oil in proper condition. Moisture in the oil is the most insidious fault which can occur and should be carefully guarded against. An exceedingly simple and satisfactory way of keeping the oil clean and dry is to install a de-hydrating outfit. This can be so arranged in the case of large transformers that the oil may be cleaned and purified without taking the transformer out of service. Self-cooling transformers are now being built in sizes up to about 3000 kw. Larger sizes than these have to be water-cooled. The ordinary water rate is one-fourth of a gallon per minute per kilowatt of loss. Large transformers should be periodically inspected about once in six months, at which time the oil should be tested, and the cooling coils should be examined to determine whether they have accumulated deposits from the oil or scale from the water. The water-cooled transformer should not be operated more than a short time without its normal circulation of water. Air-blast transformers form a class by themselves and their use is comparatively limited. They require about 150 cu. ft. of air per minute for every kilowatt of loss. Transformers of this type will quickly reach a dangerous temperature if the air blast is shut off while carrying full load. Air-blast transformers should not be wound for pressures exceeding about 35,000 volts because of the insulation difficulties encountered. When two or more transformers are to be operated in parallel or connected in banks on a polyphase system it is necessary to know their polarity in order to connect them properly. The author devoted the latter half of his paper to a consideration of the numerous polarity combinations in polyphase banks, making extended use of potential diagrams.

RECEIVING APPARATUS

Chairman F. B. H. Paine presented the report of the committee on receiving apparatus for use on transmission lines. The report was necessarily brief owing to the fact that the committee was not appointed until February of the present year. In a condensed discussion of the causes of transmission-line disturbances and interruptions the committee submitted the following suggestions: The most important thing is not to cut out equipment until it is necessary or until the disturbance is shown to be more than momentary. Inverse-time-limit relays should not be permitted. When maximum continuity of service is the first essential it is preferable to employ induction motors instead of those of the synchronous type. Where the use of synchronous apparatus is unavoidable it is desirable to provide separately driven exciters or a separate source of supply for the field excitation. No doubt exists as to the benefit derived from the use of heavy copper dampers on the pole faces of synchronous machines. The committee particularly recommended the development of apparatus for keeping a continuous record of system disturbances in order to know their actual time of occurrence and their duration, with the object of afterward carrying on such investigation as may be necessary to remove the causes.

ACCOUNTING SESSIONS

UNIFORM ACCOUNTING

The report of the committee on uniform accounting was presented by E. J. Bowers, chairman. It said that the most important problem which confronted the industry to-day was the relation of public service utilities to public service commissions and the public. All companies falling under the jurisdiction of public service commissions now had to keep their accounts uniformly. A sub-committee on public relations should be appointed, to be composed of those members of the accounting committee who have been foremost in shaping utility accounting methods and whose prestige would have great weight in inducing new commissions to adopt a standard advanced by the association. The probabilities are that every legislative body in the United States will soon establish a commission to control public service utilities, and it was quite necessary for every member company in the association to keep its accounts according to the standard classification. This in itself would have a decided tendency to induce new commissions to accept the association uniform system of accounts. The committee recommended that a sub-committee be appointed to make certain revisions in the standard classification of accounts and said that this work should be taken up immediately.

It was desirable further to determine the advisability of maintaining a statistical bureau of the association for the purpose of compiling statistics from the various member companies. The association had been asked repeatedly for standard forms of the various records, books, etc., needed and used by member companies. Certain standard forms would be invaluable and would place the association in position to furnish member companies upon request with forms of the best standard practice. The committee said it would never be satisfied until all member companies in the association should take it upon themselves to improve their accounting methods by adopting the association's uniform system of accounts.

REGULATED ELECTRIC LIGHT ACCOUNTING

This paper was read by H. M. Edwards, who said that the uniform system of accounts for electrical corporations as prescribed by the Public Service Commission of the State of New York, First District, has been in effect three years, and a petition had been filed with the commission recently, signed by nearly all the companies within its jurisdiction, asking that certain changes be made therein. The division of capital charges into original, additions, betterments, renewals and replacements was an unnecessary refinement and thus no results commensurate with the amount of labor necessary had been secured. Neither the Wisconsin nor the Interstate Commerce Commission systems embodied these features of capital subdivision. The Maryland commission had followed the example of the New York commission, but not with the same degree of particularity. When the subject of depreciation was under consideration the representatives of the lighting companies urged that no rate of depreciation or method of determining the amount should be prescribed by the commission, but that the amount of the reserve should be left absolutely to the discretion of the companies. In support of this contention it was represented that depreciation was local in nature and extent and that the conditions varied in each company. The commission had recognized this fact generally in its rule, but had provided that the amount to be reserved should be lessened by the amounts charged to the various repair accounts in electric operating expenses. This seemingly minor requirement had been the occasion of a great deal of trouble. The directors of the New York Edison Company, for instance, had some years before decided to charge to depreciation and credit to the corresponding reserve account a sum equal to 1 cent per kw-hr. sold, and this sum proved to be ample for the purpose. In accordance with the requirements this rule was filed with the commission, but as the rule did not conform to the technical requirements of the commission in regard to the amounts charged for repairs, the company was requested to amend the rule and add to the amount of reserve an additional amount which, when the repairs should have been deducted, would leave the equivalent of 1 cent net per kw-hr. sold.

The additional amount was determined by the repair records of the previous five years, but owing to unforeseen operating conditions in the subsequent years repairs were not sufficient to absorb the extra amount reserved. As, in its accounts, the company continued to charge off at the rate of 1 cent per kw-hr. sold, although its rule as filed with the commission would have called for an amount equivalent to 1.2 cents per kw-hr., the company has not conformed technically to the requirements. The commission had not definitely decided as to whether the company should be required to set aside the 0.2 cent per kw-hr. There was no economic reason why this should be done, as the present amount reserved was ample for the purposes of the corporation. The question arose simply because of the technical requirement of the rule.

The rule of the Wisconsin commission was much simpler and avoided such possibilities as are described above. Depreciation must be provided for out of the earnings. In other words, it was an expense which the company must recover in the price of the product. The sufficiency of the rate of depreciation employed can be determined only with the lapse of years, and a commission, having these facts in mind, should adopt a rule which would be general in its requirements and should avoid specific details of regulation. The evident purpose of an elaborate system of accounting such as that prescribed by the New York commission was not only to adopt a uniform system of accounts but to secure, through the medium of the accounts, control of the financial methods of the companies. On the other hand, the system adopted by the Wisconsin commission contains a simple system of accounting devised evidently by practical men for the every-day use of an intensely practical industry. There were no minute subdivisions of capital accounts, no inflexible rules in regard to betterments or depreciation reserves. The aim seemed to be simply to secure uniformity among the companies in accounting for those things which by their nature were uniform. The New York and Wisconsin commission systems are at opposite ends of a scale, and as both systems were adopted at the same time and after frequent consultation with each other and with the companies interested, it can only be that the differences are deliberate and the result of different conceptions of what should be accomplished by means of a uniform system of accounts.

HANDLING AND ACCOUNTING FOR SCRAP MATERIALS

This paper was read by Charles E. Bowden, who said that the New York Edison Company found its sales of scrap to consist principally of insulated copper wire, ends of lead cable, cast and wrought iron, incandescent lamp stubs and burned-out lamps. It was found that the principal reason for the low prices which the company had been getting for this material was that all kinds of scrap had been thrown together in a portion of the yard and was so hopelessly mixed that when bids were called for the material had to be sold for whatever was offered, since the cost to the buyer of properly assorting it into groups would be more than he could realize. To correct this, the storekeeper was instructed to take over a small outbuilding which had been used for storing reels, and at a cost of less than $100 it was equipped with a number of large bins providing a place for each class of material. By doing this the company succeeded in eliminating everything but the cost of first handling, for as quickly as the scrap was received by the stores department it was placed in its proper bin for final disposal. The economical disposal of the insulated copper and lead cable was by far the most important problem in connection with all the different materials handled, and it was found that the best results were obtained by burning off the insulation. The result of a number of experiments with wire of various sizes was an approximate loss of weight due to burning off insulation of 15 per cent. Two men were able to handle five tons a day without difficulty. The lead was cast into pigs. The various kinds of iron were accumulated for the most part from the blacksmith shop and from the breaking up of obsolete machines. Burned-out incandescent lamps as brought in by the lamp renewal department were divided into two classes, burned-black and clear. The burned-black lamps were broken up, the stubs saved for the platinum and the rest thrown into their bin to accumulate. Clear lamps were packed into barrels and shipped away to the factory for new filaments. All sales of scrap material were made by the purchasing agent, and by studying and taking advantage of the market he could often more than save his salary for the company during the course of the year. Scrap copper is now used by the smelters to a great extent in producing casting copper, and it was the practice of the larger companies to sell their scrap to the smelters at a price based on the New York price of casting copper. The pig lead was mostly used in the company's own plant in making solder. Iron was allowed to accumulate until the bins, which held about 5 tons each, were full. Then bids were obtained from the leading scrap dealers and the lot was sold to the highest bidder. As these scrap dealers were, in many cases, large customers of the company, it did not insist on purchases being made on a strictly cash basis, and in most cases it allowed thirty days for payment. Lamp stubs were sold in 1000-lb. lots at 10 cents a pound and the clear burned-out lamps were sold in barrels of 500 at $5 per barrel, prices in all cases being f. o. b. at its warehouse. During the last three months the company had sold over $50,000 worth of scrap material, mostly copper, and from its accurate records it was found that the serious and persistent effort to handle this branch of the stores department efficiently had resulted in a saving of over $10,000 to the company.

COMMERCIAL SESSIONS

ELECTRICITY IN RURAL DISTRICTS

The committee on electricity in rural districts submitted a report which gave data upon the cost and energy consumption of electrically driven farming equipment, irrigation systems, and besides describing an extensive installation of farming motors in Illinois, concluded with an exhaustive bibliography of electricity in agriculture.

The results of a large number of tests made under the auspices of the General Electric Company were presented in the report in detail and in a tabular summary. The tests were unusually complete in giving full particulars of the connected load in practically every instance, character and amount of material handled, mechanical conditions of machine driving, labor costs, fixed charges, energy consumption, maximum and average loads, total and unit costs. All operating costs were figured on the basis of an energy rate of 5 cents per kw-hr. Interest charges were figured at 6 per cent and depreciation at 10 per cent.

OZONATORS

M. O. Troy read a paper entitled "Ozonators and Their Exploitation by the Central Station." Mr. Troy stated that during the last few years the methods of producing ozone electrically had advanced to such an extent that it was now possible to exploit it commercially for its great therapeutic, sanitary and industrial qualities. After describing the qualities of ozone and the conditions under which it is produced in nature, Mr. Troy referred to a number of practical applications which had been made with electric ozonating machinery in banks, printing shops, club rooms, theaters and other places where it was desirable to have a constant supply of fresh sterilized air. As described in the Electric Railway Journal for March 23, 1912, ozonating machinery is in use at the stations of the Central London (underground) Railway.

A company organized in Stockholm, Sweden, to build a subway to connect railroad terminals and extend into the suburbs has sent an engineer to New York to study subway construction and operation.

THE NATIONAL ELECTRIC LIGHT ASSOCIATION CONVENTION AT SEATTLE

The thirty-fifth annual convention of the National Electric Light Association at Seattle, Wash., began Monday night, June 10, with the opening of the exhibits and the reception to President and Mrs. John F. Gilchrist. A promenade concert and dance followed the reception. On Monday afternoon, after the preliminaries of registration had been completed, the delegates and guests were taken in special cars to the campus of the University of Washington, where a game of baseball was played between the Pacific Coast baseball team and a nine made up of men from east of the Rockies The coveted prize was the Westinghouse Cup, contested for last year in New York and held by the nine of the Edison Electric Illuminating Company of Brooklyn. The game was won by the Western team, the score being 16 to 3.

The first general session of the convention began on Tuesday morning at 10 o'clock with President Gilchrist in the chair. The first speaker was Mayor G. F. Cotterill, of Seattle, who in his welcoming address mentioned the rapid growth of the city, likening its development to that of the electrical art. He admitted the obligation of the city to that art, especially in the washing down of hills by electrically operated pumps to permit of its logical expansion. He maintained that Seattle is the best lighted city in America, backing up this contention with statistics showing that it possessed 1631 tungsten cluster posts and some 8000 additional lamps of various types on its 25 miles of streets.

After thanking the Mayor for his presence and inspiring address President Gilchrist surrendered the chair to Vice-president Tait to deliver his presidential address.

PRESIDENTIAL ADDRESS

President Gilchrist said that much of the work of the association was now continuous from one general convention to another, the work being accomplished largely by standing committees. The committee report has largely supplanted the paper by the individual. Class B membership would continue to extend rapidly, not only as a result of the formation of company sections but on account of the increasing desire on the part of individuals to participate in the membership and get the advantage of publications. The greatest effort, however, should be in increasing the company, or Class A, membership.

The plan of inviting state associations to affiliate with the national association was working out slowly. During the year the Northwest Association, the Michigan Electrical Association and the Iowa Association had been taken in. This movement was a little slow, but the results were satisfactory. The presidents of the different affiliated associations, as ex-officio members of the executive committee, have a voice in the management of the parent association, and their respective associations become a part of the national body in fact as well as in name and membership.

There had been much growth during the year in the company sections. A few new sections had been formed, but the growth had been principally on account of the accession of a large number of members to the older sections. This work should be encouraged and extended as much as possible. Very few companies were too small to find a company section practicable. The experience of those companies which have been pioneers in the movement would indicate that nothing had done more for the association since it was first organized than the company section movement. The company which did not promote a company section within its ranks was denying itself and its employees a great deal of benefit.

The income of the association at the present time from all sources was somewhat over $100,000 per annum, but the reserve fund investment was only $15,000. While a very large reserve fund might not be necessary or desirable, an association of the size of this one should have a fund of at least $500,000 well invested to insure an income of from $20,000 to $25,000 a year over and above that derived from other sources. Such resources would put the association in a position to take up almost any work which might present itself.

A relationship which should be better cultivated in the future was that between the National Electric Light Association and the various institutions of learning throughout the country. For various reasons, particularly questions relating to the value of public service corporations, it would be desirable to have a standing committee on relations with institutions of learning. The National Electric Light Association should also maintain toward the public service commissions an attitude of cordial and friendly co-operation in arriving at what is right and fair in relations between public service corporations and the public.

Political expediency and the self-interest of a certain proportion of the public would probably always be decided factors in discussions on municipal ownership, but the question could be dealt with from the standpoint of the "greatest good to the greatest number." It could be shown that under present conditions better service could be rendered at the same price, or the same service at a lower price, in all branches of public utility work by privately owned corporations than by municipally owned ones.

For two years past a committee of the association had been studying electricity rates. This question was naturally one of paramount importance in the eyes of the public service commissions. At present these commissions did not feel sufficiently sure of their position to take any very radical steps, but the time was close when on the initiative of the companies which form the National Electric Light Association uniform rate systems must be put into effect.

Much interest had been shown in plans for adding to the welfare of central-station company employees. Employees' clubs, savings and investment plans, pension schemes, athletic events, entertainments, the attendance of physicians and visiting nurses and similar arrangements for the welfare of the employees were becoming yearly more common. Somewhat in line with this work, the association had been fortunate this year in helping to obtain the appointment of a body known as the Resuscitation Commission, consisting of the most eminent medical and electrical men. This commission has been studying the effect of electrical shock on the human system in order to treat more intelligently and successfully cases of this kind, and also to revise and prepare for publication rules and diagrams in the application of first-aid methods.

MISCELLANEOUS BUSINESS ON TUESDAY

The usual custom of submitting the recommendation of the president to a committee for final report and definite action was followed. The committee consists of W. C. L. Eglin, of the Philadelphia Electric Company, Philadelphia, Pa.; J. C. Davidson, Pacific Power & Light Company, Portland, Ore., and R. H. Ballard, Southern California Edison Company, Los Angeles, Cal. Following the appointment of the committee on the president's address J. A. Britton, Pacific Gas & Electric Company, San Francisco, Cal., invited the association to hold its convention in San Francisco in 1915 at the time of the Panama-Pacific Exposition.

The report of the committee on organization of the industry was presented by H. H. Scott, of the Doherty Operating Company, of New York. Statistics were given of the present status of the organization, the membership of which totals 12,084. During the year three geographic sections and nine new company sections have affiliated with the national body, so that there are now ten geographic sections and thirty-seven companies represented.

In his annual report Secretary Martin mentioned that out of an income of approximately $100,000 almost one-half is spent on the publications of the association. The cost of the *Proceedings* during the past year was approxi-

mately $20,000, to which must be added $7,000 for advance copies of papers and reports distributed at the New York convention. In order to reduce these expenses to a minimum, it is planned hereafter to subdivide the *Proceedings* into technical, commercial, accounting and transmission volumes. During the year 12,502 volumes of the *Proceedings* were printed, 2500 copies of the revised edition of the Question Box and 400 copies of the "Electrical Solicitors' Handbook," while for the present convention an edition of the "Electrical Meterman's Handbook," a volume of nearly 1000 pages, has been prepared. In addition, the commercial section has brought out 2000 copies of the "Commercial Digest," in loose-leaf form, and three pamphlets devoted to industrial lighting, residence lighting and street lighting. During the year the commission of the association on the subject of resuscitation from electric shock has issued through the association a chart and pamphlet, 1500 copies of which were printed for the convention.

Following the presentation of the report on insurance by W. H. Blood, Jr., T. C. Martin presented in abstract the first part of his report as the committee on progress. E. A. Edkins, of Chicago, then presented the report on the Question Box. The concluding paper of the session was one on "Expanded Loyalty," by Paul Lupke, after which the first general session adjourned.

MEETINGS OF TRANSMISSION SECTION

The first meeting of the transmission section on Tuesday was opened by Henry L. Doherty, who characterized the present policy of the federal government in the conservation of water power and other natural resources as promulgated and sustained by extremists. C. H. Williams presented a paper on the "Use of Electricity for Irrigation and Agricultural Purposes." He showed by lantern slides and motion pictures the application of electrical energy to irrigation and other uses on farms in northern Colorado.

The second meeting of the transmission section, held on Wednesday, June 12, was opened with an address by R. A. Ballinger, former Secretary of the Interior. Mr. Ballinger reviewed the history of public lands and expressed the opinion that title of them should be turned over to the various states so that each community may regulate the development of its own natural resources. The policy of the present administration to regulate the development of natural resources under public domain was burdensome and unreasonable and constituted a serious bar to progress. Mr. Ballinger said he was opposed to President Taft's policy to leave coal lands under the ownership of the government. Several speakers indorsed Mr. Ballinger's remarks and the session closed after it had been voted to change the name of the section to the "hydroelectric and transmission section."

OTHER SESSIONS

The keynote of the commercial sessions was sounded by W. W. Freeman, who pointed out that while improvements in technical efficiency of apparatus had almost reached their limit, the fullest development of the central-station industry in the future must take place in the commercial end. The meetings of the accounting session were devoted chiefly to discussions on rates.

The public-policy meeting was held on Wednesday night. The report was read by Samuel Insull, Chicago Edison Company, who stated that the committee represented $1,000,000,000, or one-half of the money invested in the electric lighting and motor-service business in the United States. He strongly advocated, as heretofore, the concentration and distribution of electricity in the hands of a single corporation, and welcomed the formation of public service commissions, asserting that only by this means could the incidental troubles from competition be eliminated in a business which from its very nature should be monopolistic.

In presenting the report of the medical commission on resuscitation from electric shock, W. C. L. Eglin paid a high tribute to W. D. Weaver, of the *Electrical World*, for his labors in bringing about the formation of such a commission. On motion of H. L. Doherty a vote of thanks was extended to the American Medical Association and the present committee was continued for another year.

ENGINEERING ASSOCIATION REPORT ON COMMITTEE PROGRESS

Norman Litchfield, secretary-treasurer American Electric Railway Engineering Association, has sent to members under date of June 1 a circular which gives the membership of and summarizes the work done to date by each committee of the association. The minutes of the various committee meetings as they occurred have already been printed in the Electric Railway Journal.

The committee on way matters, in addition to its usual subjects, is considering the value of titanium, nickel, chronium or other cleansing materials used in rail making. The sub-committee on this subject will work in conjunction with a committee from the American Society for Testing Materials. The committee on power generation has four sub-committees covering high-tension cables, chemical laboratory practice, peak loads and boiler setting and furnace design. A joint committee from the Engineering and Accounting Associations is considering interdepartmental charges.

The committee on equipment has nine sub-committees covering rubber-insulating compound, couplers for interurban cars and end connections to cars, self-propelled cars, heat-treated gears and pinions, end wear on journals, squealing of steel wheels, axle specifications, steel wheel specifications and wrought-iron specifications. A circular letter has been sent to the members requesting information in regard to squealing of wheels and to couplers for interurban cars and end connections of cars. The sub-committee on steel wheels has held several conferences with the representatives of the American Society for Testing Materials, and it is expected that specifications will be presented by the committee at the coming convention. The American Society for Testing Materials also presented at its annual meeting in March a specification covering various classes of steel wheels, including wheels for railway motor service, but at the request of the sub-committee of the Engineering Association the latter reference was stricken out pending the result of the conference between the two societies. L. M. Clark, master mechanic Indianapolis Traction & Terminal Company, has been appointed a special representative of the Central Electric Railway Association standardization committee on various subjects now before the committee on equipment.

The committee on heavy electric traction is to discuss with other engineering bodies interested the subjects of permanent way construction, clearance lines in relation to third-rail conductors and location and clearance lines for automatic train stops. The committee on buildings and structures has sent out circular letters requesting copies of standard specifications for buildings, bridges and other work; also for the form of contract used with specifications and the standard form by which the contractor furnishes the bonds. The committee on power distribution is making progress on all of its subjects except the revision of the present standard copper wire table, which is being held in abeyance pending the action of the United States Bureau of Standards. The joint committee on block signals for electric railways is also making good progress.

The Accountants' and Engineering joint committee on life of railway physical property is collecting data on that subject, and it is expected that a meeting of the committee will be held shortly. The Engineering and Transportation & Traffic joint committee on multiple-unit operation has also made considerable headway in the collection of data. No report was presented on the standardization committee.

Cedar Point Meetings of Central Electric Railway and Accountants' Associations

Telegraph Report of the Discussions Before Both Organizations on Standardization, High-Tension Work, Design of Motor Frames, Local Freight Accounting, Interline Waybills, Billing of Customers, Etc.

CENTRAL ELECTRIC RAILWAY ASSOCIATION

THURSDAY SESSION

The regular summer outing meeting of the Central Electric Railway Association was held at Cedar Point, Ohio, June 13 and 14. The session on Thursday, June 13, was attended by about eighty members. After the meeting was opened by President Whiting Secretary Neereamer read the minutes of the previous meeting, which were duly approved.

STANDARDIZATION REPORT

Chairman H. H. Buckman then read the standardization committee's report, which contained a comparison of the equipment standards of the Central Electric Railway Association and of the American Electric Railway Association. It recommended that certain changes should be made in the form of the Central Electric Railway Association standards so that they would comply more nearly to those of the national association. In the discussion which followed this report, the members decided that the changes in the Central Electric Railway Association standards should be submitted for approval to the standardization committee of the American Electric Railway Association.

The standardization committee also reported that it had investigated the question of providing controlling dimensions of trolley wheels and axle pins. In line with this work it will distribute data sheets upon which the members will be asked to give certain additional information. Action upon the committee's investigation of conductors' train signal systems was delayed in view of the fact that the subject of end-connections of cars had been assigned to the 1912 equipment committee of the American Electric Railway Association.

PROTECTION IN WORKING ON HIGH-TENSION LINES

A progress report on the work of the committee which is investigating the cutting out of high-tension lines when making repairs was presented by its chairman, G. K. Jeffries, superintendent of the Brazil & Danville lines, Terre Haute, Indianapolis & Eastern Traction Company. He said that there was considerable difficulty in deciding upon a recommended practice because certain conditions on some roads made it practicable to require the linemen to get into touch with the substation attendant, who, in turn, might refer the request to the chief engineer at the power house. Other roads preferred to have the order go through the train dispatcher. Either method was right, but the choice depended on the operating conditions of the railway. Upon the request of Mr. Jeffries the committee received more time to investigate the subject.

CENTRAL ELECTRIC RAILWAY MAP

Secretary Neereamer submitted a proof of a revised map of the electric railways and steam railroad connections in the territory which is served by the members of the Central Electric Railway Association. He said that the traffic committee of the association had been working for some time on the revision of this map and now submitted it through him for the final approval of the association. It was decided that if the plate was accurate the secretary should be authorized to have prints made of it. Five new members were admitted to the association after due approval by the executive committee.

DESIGN OF MOTOR FRAMES

The next order of business was a paper by M. B. Lambert, Westinghouse Electric & Manufacturing Company, on "Split-Frame Versus Box-Frame Railway Motors." This paper appears elsewhere in this issue. Mr. Lambert added that his object was to show that there were two types of motor frames in demand and that manufacturers must carry both in stock. This was more expensive than if one type was used, because the railways had to pay the extra cost. In reply to a question, Mr. Lambert said that split-frame motors were more costly than box-frame motors of the same type.

R. M. Hemming, superintendent motive power Indiana Union Traction Company, stated that his road used both types. It was hard to standardize upon one or the other. Some roads were able to furnish the additional shop space necessary to handle the repairs to box-frame motors; others were so small that they could not afford to provide the extra space, and it was probable that for a long time to come they would not develop sufficiently to permit a change in policy. He had had trouble with both types, namely, loose bolts in the split-frames and inaccessible fields in the box frames.

Mr. Lambert said that much field trouble was due to excessive vibration, but in the box-frame type this could be practically eliminated by installing heavy springs behind the coils. He also recommended the use of strap-wound coils in place of wire-wound coils, although the former were more expensive.

E. J. Burdick, superintendent of power, Detroit United Railway, recommended the box-frame type because it was more nearly waterproof and required more rigid inspection than that given to split-frame motors over a pit. Easy inspection made careless inspectors.

Mr. Lambert said that another reason for presenting his paper to the association was to obtain an opinion in favor of or against the split-frame motor. If favorable opinions were advanced his company was ready to make further experiments to improve the design of split-frame motors.

Walter H. Evans, Edgar Allen American Manganese Steel Company, Chicago, said that he had had considerable experience with both types of motors. He believed that much of the prejudice against the box-frame motor was due to lack of familiarity with it. It formed a solid foundation from which to work. Some large railways had purchased split-frame motors when they started and had never tried the box-frame type. The first motors were not of good design, nor of sufficient dimensions to give good service, but that was not the case with the types in operation now. Furthermore, he believed that the association members would get better results from their motor equipments if the hammer and monkey wrench were used upon them as little as possible. Frequent use reduced efficiency. In concluding his remarks, Mr. Evans mentioned that the late E. H. Anderson, motor designer for the General Electric Company, had been a firm believer in the box-type design.

OTHER PAPERS

At the close of the discussion on motors, A. J. Boardman, superintendent Terre Haute, Indianapolis & Eastern Traction Company, read his paper on "Interurban Traffic Analysis with Its Relation to Timetables." This paper is published elsewhere in this issue.

C. L. Henry, president Indianapolis & Cincinnati Traction Company, complimented Mr. Boardman upon his excellent paper and recommended it to the careful study of

every member. He said that its very thoroughness made it impracticable to discuss properly without receiving a careful reading.

In the absence of W. B. Milligan, electrical engineer Western Ohio Railroad, F. B. Carpenter, general manager of the same road, read his paper on "Sale of Current to Municipalities and Industries Along Interurban Lines." Mr. Milligan's paper is printed elsewhere in this issue.

The last order of business was the paper on "Transmission Lines Versus Foreign Low-Potential Lines," by J. G. Swain, superintendent power and shops, Cleveland, Painesville & Eastern Railroad. In the discussion of this paper, as printed elsewhere in this issue, it was recommended that a copy be sent for consideration to the committee on power distribution of the American Electric Railway Engineering Association.

The Thursday session was then adjourned.

CENTRAL ELECTRIC ACCOUNTANTS' ASSOCIATION

THURSDAY SESSION

The twentieth regular meeting of the Central Electric Railway Accountants' Association was held on Thursday, June 13, and Friday, June 14, at The Breakers, Cedar Point, Ohio. The first session began on Thursday at 9.30 a. m. with a meeting of the executive committee in response to a call by President Walter Shroyer, auditor Indiana Union Traction Company. No special business of importance was transacted by the committee but applications for membership were read and passed upon, as follows: J. N. Tabb, treasurer Parkersburg, Marietta & Interurban Railway Company; R. H. Evans, auditor Toledo, Fostoria & Findlay Railway; R. J. Wells, auditor Dayton, Springfield & Xenia Southern Railway, and C. H. Hendricks, auditor Evansville Suburban & Newburg Railway.

The regular business session began at 1.30 p. m. with sixteen representatives from as many electric railways present. The reports of the secretary and treasurer, which were read and approved, showed the association to be in excellent financial condition.

LOCAL FREIGHT ACCOUNTING

E. L. Kasemeier, auditor Ohio Electric Railway, read the report of the standing committee on freight accounts. This was devoted to the subject of how best to handle local freight accounts. The report included a long descriptive list of the forms needed for the different parts of the work. With regard to handling freight records and accounts at agencies and the auditor's office, it was recommended that monthly accounts would generally be preferable to a strictly daily plan, because the greater the number of agencies from increasing business the greater would be the chance for mistakes getting through the auditor's office. Furthermore it would be very difficult properly to keep the stock ledger of tickets at each station, and also to prepare monthly reports to foreign roads of interline ticket sales.

The report then outlined the procedure that should be followed under the daily plan on a small road with light freight business and say ten agencies. It covered the forms needed, the acceptance and billing of freight received from shippers, the handling of freight received at the station to be delivered to consignee, the abstracting of waybills forwarded and received, the use of the cash book, the accounting for special revenue, special credits to agents on account of lost and refused shipments, agents' drafts as for junction settlements, preparation of agents' daily balance sheets, corrections on waybills or daily reports, uncollected bills, reports on interline freight passing junction, O. S. & D. (over, short and damaged) reports, revenue billing for astray freight, handling of daily reports in the auditor's office, and auditors' books and entries. The procedure for roads where the monthly plan was advisable was outlined in like manner. Sample journal entries and traffic book accounts were included for use with either the daily or monthly system.

Mr. Kasemeier's report brought out much lively discussion, L. T. Hixson, who is a member of the committee, advised that in handling correction accounts all corrections should be treated through a regular account established for that purpose.

F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, suggested the advisability of printing the full report of this committee together with all forms and other data.

A. F. Elkins, auditor Columbus, Delaware & Marion Railway, suggested that the report be printed and sent to each member and that blank forms be forwarded therewith on request. Later, when the reports for the year were included in the revised pamphlet, each member would have the full proceedings of the year. This suggestion was adopted.

INTERLINE WAYBILLS, ETC.

The question of interline waybills was next discussed. Some members said that they were unable to procure copies of all such bills. The committee finally adopted the plan of having auditors send weekly copies of all interline waybills to all interested lines. This decision seemed satisfactory to those present.

The report of the compiling committee was next read by Mr. Hixson, chairman, and adopted. This report covers all the meetings of the association from the first to the nineteenth inclusive. It gives a complete list of officers and members, the constitution and by-laws and all committee reports and papers. It was decided to supply each member with a paper-bound copy of this pamphlet free. Additional paper-bound copies will be supplied at $1 each, and cloth-bound copies will be furnished at $1.25 each. These books will also be sent to non-member lines upon request. Upon motion of Mr. Elkins, the association voted to forward copies of this report to the Electric Railway Journal.

ACCOUNTING SYSTEM FOR ELECTRIC LIGHTING PROPERTY

E. D. Gault, secretary Mahoning & Shenango Railway & Light Company, read an interesting paper on the methods of accounting used in the electric lighting properties, particularly the method of conducting the consumers' accounts. This paper was presented at the request of the president of the association, because several railway companies are considering the question of engaging in a commercial lighting business. Mr. Gault said that under the present public service law electric lighting companies are required to file annual reports with the Public Service Commission, as well as the Tax Commission, and the first report filed with the Public Service Commission is to be for the year ended June 30, 1912. They must be filled out and returned by Sept. 30. The classification of operating expense accounts required by the two commissions is the same, but the classification for capital and revenue accounts is somewhat different. Both classifications also differ from the standard classification of the National Electric Light Association. The description by Mr. Gault of the method of conducting consumers' accounts included a description of the routine followed when a customer made application for electric service or for its discontinuance, the different methods of reading meters and of billing, and the policy followed by his company in regard to credits and collections.

The discussion of Mr. Gault's paper brought out the proper method of making annual reports to the several state commissions. Mr. Elkins stated that his company owned and operated an electric light plant which was classified under "Electric Light & Power Department." The reports were made annually to the public service commission and tax commission of Ohio upon the regular form prescribed for electric railways. No separate reports were required where the railway company owned and operated a lighting plant as a department of the railway.

The question of the proper method of making out bills was next considered. Many of the auditors present stated that it was the custom of their companies to send out the bills on postal cards with a stub attached. Mr. Gault said that his company made out all the bills on a special form which was suitable for deposit in a designated bank like a draft. Many consumers had requested that this method be followed monthly instead of mailing bills direct.

MISCELLANEOUS

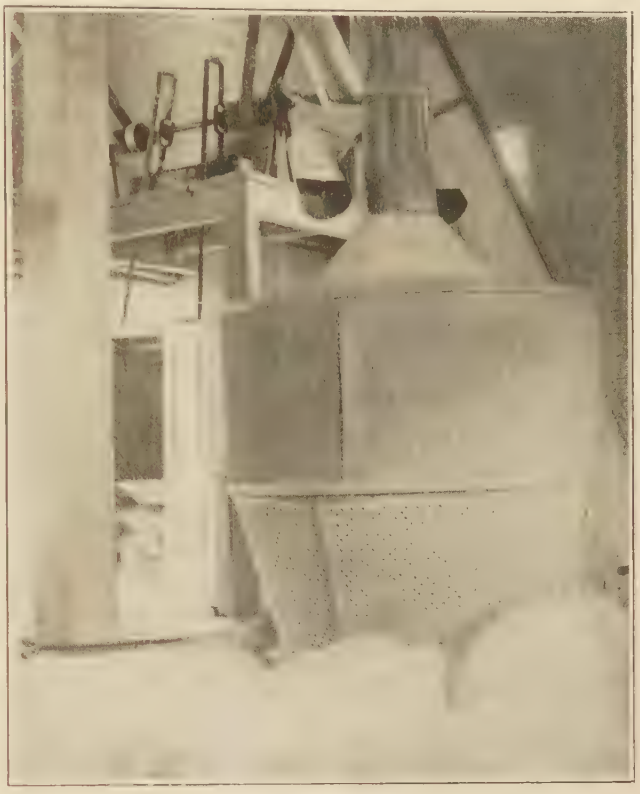
After discussion of Mr. Gault's paper, the members adjourned to take part in a baseball game between the railway and supply men. The supply men won by a score of 20 to 13. W. H. Hinman, of the Peter Smith Company, was captain for the supply men, and L. K. Burge, general superintendent Lake Shore Electric Railway, was captain for the railway men.

MOTOR-DRIVEN SAND-DRYING EQUIPMENT AT SALT LAKE CITY

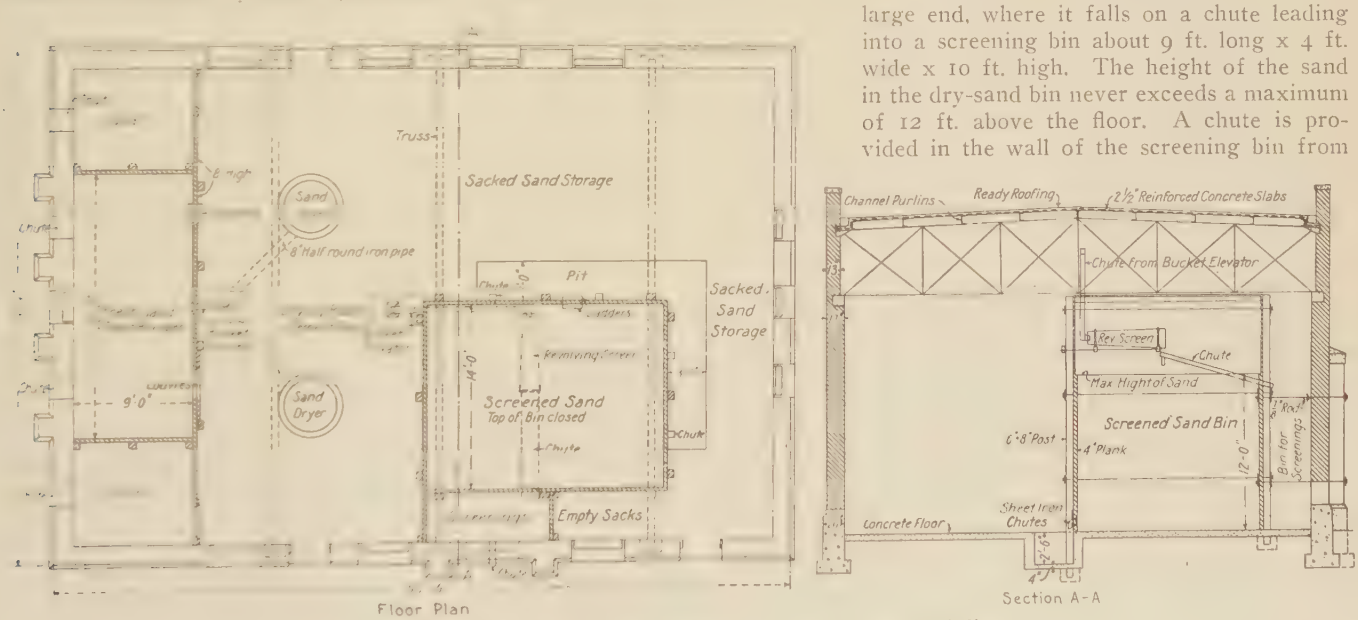
The Utah Light & Railway Company has recently completed at its new car repair shops in Salt Lake City a semi-fireproof, motor-driven sand-drying plant which is of considerable interest on account of the arrangement for the progressive handling of material from the point of receipt to the storage and delivery outlets. The drying plant is installed in a brick, steel and concrete structure, 55 ft. 6 in. long x 38 ft. 9 in. wide. Wet sand is received from cars or teams discharging into chutes on the north side of the building and is stored temporarily in a fresh sand bin 20 ft. long x 9 ft. wide x 8 ft. high. The chutes are of the Koenius type, with 20-in. x 16-in. openings. Two are provided for handling sand, and two others of the same size discharge directly into coal-storage bins flanking the fresh sand bin. The fresh sand bin is built with an open top to promote evaporation of the moisture. The walls, which are of brick in the rear and 4-in. planks in the front and sides, are stiffened by three 1⅛-in. steel tie rods with take-up bolts on the ends. Four ⅞-in. steel rods are also provided to cross-brace the bin.

From the fresh sand bin the sand is delivered by gravity into a pit at the bottom of a bucket elevator, which raises the sand about 12 ft. above the floor for delivery into either of two sand driers of the coal-burning type, through diagonal chutes terminating in two outlets which spread the sand evenly around the tops of the driers. The sand is delivered from the driers on a cement floor extending entirely across the building. A pit is installed in the middle of this floor with a hopper above a bucket elevator which leads to a revolving screen at the top of a screened sand bin 18 ft. long x 14 ft. wide x 18 ft. high. The revolving screen is conical with the receiving chute at the small end, and the coarse, foreign matter is passed along the screen to the large end, where it falls on a chute leading into a screening bin about 9 ft. long x 4 ft. wide x 10 ft. high. The height of the sand in the dry-sand bin never exceeds a maximum of 12 ft. above the floor. A chute is provided in the wall of the screening bin from which this material can be drawn off and carried away outside the building. Four chutes are installed in the dry-sand bin, two on each side, for delivery into a pit with a cement floor, where sand is sacked. On the outside of the sand-storage bin is a storage space for empty sand sacks and sacked sand in bulk. The cars of the company are all provided with sand in bags.

The elevators and revolving screen are driven by a 5-hp, 220-volt, three-phase induction motor.



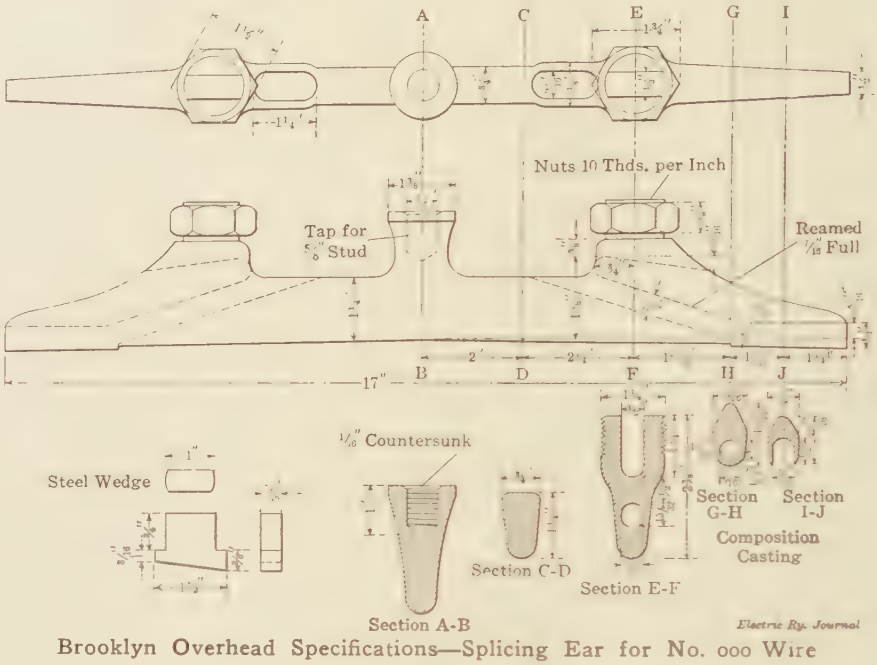
Salt Lake Sand Drier—Interior of House



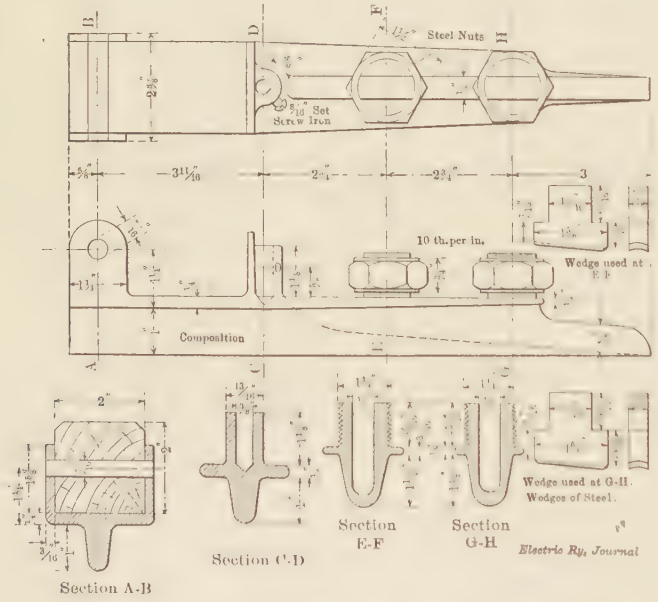
Plan and Section of Salt Lake City Sand Drier Building

BROOKLYN SPECIFICATIONS FOR SPLICING EARS AND END CASTINGS

The following paragraphs present the specification for composition splicing ears and end castings which has been adopted recently by the Brooklyn Rapid Transit System. This company's specifications for trolley ears, lead-covered, paper-insulated cables, high-strength round trolley wire and metal trolley poles were published in the Electric Railway Journal for Feb. 17, 1912. The issue for Nov. 5, 1910, contained the Brooklyn specifications for rubber-covered wires, submarine cables, varnished cambric or cloth-covered cables, galvanized span wires, trolley wire, wood strain span insulators and trough hangers. With regard to the drawings mentioned in the following specifications, it should be stated that L-657-2 (No. 0 splicing ear) was printed on page 139 of the Electric Railway Journal for July 23, 1910, and drawings L-548-2 (long end casting) and L-494-1 (short end casting) were printed on page 17 of the issue for June 11, 1910. The drawings reproduced in the accompanying cuts are L-556-1 (end casting for jumper at Kinnear door), L-569-1 (No. 00 splicing ear) and L-639-2 (No. 000 splicing ear). The No. 0000 splicing ear is of the same general design as the No. 000 ear, but differs, of course, in several of the dimensions, such as an increase of 1 in. in the length over all and an increase of ⅛ in. in thickness of the ends.



Brooklyn Overhead Specifications—Splicing Ear for No. 000 Wire



Brooklyn Overhead Specifications—End Casting of Door Jumper for Steel Rolling Doors at Carhouses

SPECIFICATION FOR COMPOSITION SPLICING EARS AND END CASTINGS

Types of Castings—The various types of castings covered by this specification are as follows:

	Weight Without Nuts or Wedges	
	lb.	oz.
No. 0, type N splicing ear, drawing L-657-2	4	02
No. 00, type N splicing ear, drawing L-569-1	4	0
No. 000, type N splicing ear, drawing L-639-2	4	0
No. 0000, type N splicing ear, drawing L-660-2	5	11
Kinnear end casting, drawing L-556-1	3	10
Long end casting, drawing L-548-2	7	9
Short end casting, drawing L-494-1	4	8

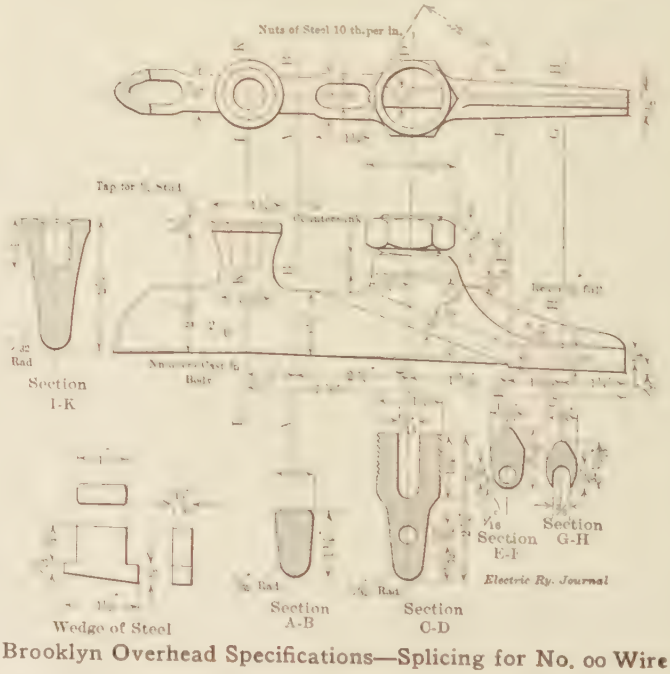
Manufacture—The castings are to be made to the dimensions called for on the blueprints, the grooves for the wire being carefully milled so as to leave an equal thickness of metal on each side.

Weights—No castings will be accepted that weigh less than the amounts specified in the table. (This table is reproduced in the first column of this page.)

Composition—While the composition of the mixture used will not be exactly specified, it must come within the following limits:

	Per Cent
Copper not less than	85
Tin not less than	6
Zinc not more than	6
Lead not more than	3
Other metals not more than	1

It must be understood that the above mixture is to be contained in the finished casting, so that any changes in the composition, due to volatilization under heat, must be allowed for.



Brooklyn Overhead Specifications—Splicing for No. 00 Wire

Tinning—It will not be necessary to tin the grooves for the wire.

Tests—Tests of the castings will be made at the Transit

Development Company's laboratory after delivery of the order. A sample of the material will be taken from each type on each delivery and analyzed, and if the composition of this sample does not come within the limits specified the entire lot of that type delivered at that time will be returned.

Marking—In each casting will be cast some distinctive mark, so that the company which made it can be easily recognized.

THE ZANESVILLE CARHOUSE OF THE OHIO ELECTRIC

The Ohio Electric Railway Company recently acquired the buildings and property owned by the Blandy Machine Company at Zanesville, Ohio, and is engaged in converting them into a carhouse and storage yard. The remodeled building will be used as a repair point for all interurban cars operating on the eastern division of this company's lines and for the cars operated in Zanesville.

The property is situated on Underwood Street between Elm and Franklin Streets, convenient to both the street railway and interurban tracks. The one-story section of the building on Elm Street is 116 ft. x 72 ft., and a two-story section on Underwood Street 203 ft. x 50 ft. The building is of slow-burning mill construction, consisting of 17-in. brick walls in the two-story section and 13-in. brick walls in the one-story section on which rest built-up wooden trusses supporting a slate roof. The work of remodeling will include tearing down 51 ft. of the Elm Street building, reconstructing the remaining 65 ft. so that it may be used as a machine and general repair shop, and arranging the Underwood Street section so it may be used for car storage and inspection purposes.

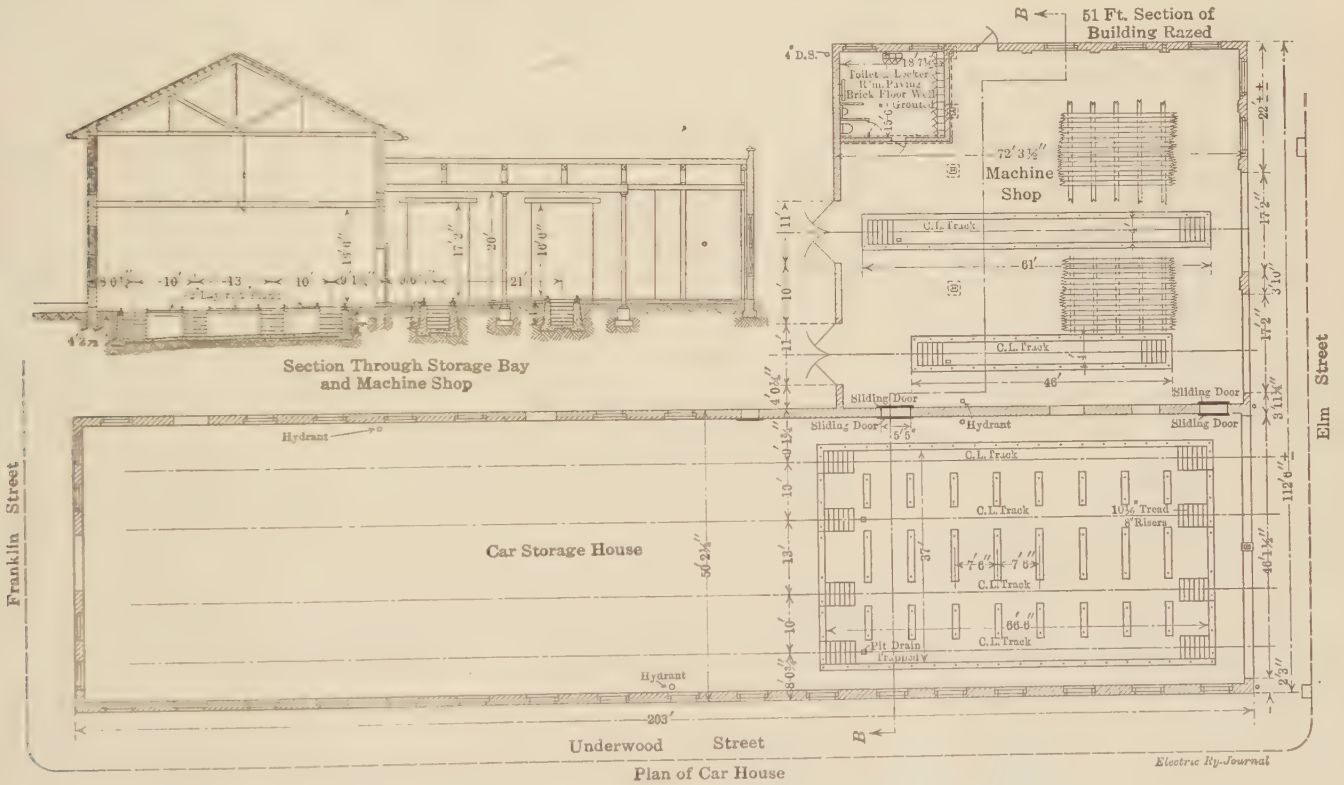
Four tracks will lead from Elm Street into the storage bay, and two tracks will be extended through the machine shop section to the vacant property in the rear of the building. A storage yard will be constructed on the property included in the angle of the building which will extend from Elm to Franklin Streets. The space vacated by razing the 51-ft. section of the shop building on the Elm Street side affords an entrance to the yard.

The second story over the storage bay will be removed so as to provide additional head room. A trestle type of inspection pit will be constructed under the four tracks in the storage bay just inside the Elm Street entrance, which will be 68 ft. 6 in. long and 4 ft. deep. The concrete piers supporting the track over the pit in the storage bay will be spaced at 7-ft. 6-in. intervals, and 7-in. 70-lb. T-rails supported on wooden bearings securely anchored to the concrete piers will be used to bridge the intervals between the piers. The floor space between the tracks has been covered with two layers of 2-in. plank flooring. Two pits will be constructed under the tracks leading into the machine shop. One is to be 46 ft. long and the other 61 ft. long. The machine shop will be equipped with all the tools necessary to handle general repair work on both city and interurban cars.

It will be necessary to cut an 18-ft. x 46-ft. 1½-in. opening in the Elm Street front of the car storage bay and to carry the old wall above the opening on two 18-in. I-beams supported at the center by an 8-in. girder beam column. Two 17-ft. 2-in. x 17-ft. openings also will be cut in the machine shop wall on the Elm Street side and two 11-ft. x 17-ft. openings will be cut in the back wall so that cars may be stored on the property back of the shop.

The openings on Elm Street will be provided with steel rolling doors. Hinged center posts will be installed at the two large openings so as to stiffen the large door area against wind pressures. The two openings at the back of the machine shop will be provided with two pairs of hinged wooden doors. The small openings in the partition between the storage bay and the machine shop will be supplied with an underwriter's specification sliding door on each side of the wall. The fire protection will consist of four standard underground 3-in. hydrants which will be installed at central locations in both the machine shop and the storage bay of the carhouse.

The property was purchased for approximately $30,000 and the reconstruction complete will cost about $10,000. The work of preparing the plans for remodeling and reconstruction was done by the engineering department of the Ohio Electric Railway Company.



Plan and Section of Zanesville Carhouse—Ohio Electric Railway

NORMAL SERVICE ON BOSTON ELEVATED RAILWAY

Service on the lines of the Boston (Mass.) Elevated Railway was practically normal on June 13, 1912. The men who went on strike on Friday morning, June 7, did not cripple the service to anything like the extent which they expected, and the company was prepared that evening to operate its night service and endeavored to do so until riotous and violent acts prevented the safe transportation of passengers. On Saturday night, June 8, the company discontinued service on such portions of its lines as could not be operated with safety to passengers, employees and property, but on Sunday it operated nearly its full service until dark, and in the evening it operated its rapid transit system and twenty-one lines connecting therewith, furnishing service to substantially all parts of the system. On the same day the company inserted the following advertisement in the daily newspapers:

"Having in mind that some of our employees who withdrew from the company's service without giving notice may have been misled, and in order to give them an opportunity to return to the service, it is hereby announced that any such may apply for employment before 12 o'clock noon of Monday, June 10, 1912, at the office of his division superintendent.

"Under no circumstances will the company re-employ any man who has committed acts of disorder, either to person or to property."

On June 10, 1912, a committee of officials from the State and city organizations of the American Federation of Labor and of the Boot & Shoe Workers' Union called on the Governor at the State House in the interest of conciliation and by his suggestion on Mayor Fitzgerald of Boston. As a result the Mayor sent the following letter to the State Board of Conciliation and Arbitration:

"Under the terms of Section 2, Chapter 514, of the Acts of 1909, it becomes my duty to inform you that a strike of the employees of the Boston Elevated Railway has been in existence during the last three days. The number of employees affected is clearly in excess of the number stated in the act. I believe that the emergency is one that calls for immediate action by your board."

Cessation of hostilites and the return of the strikers to work is the legal prerequisite to State arbitration. Moreover, the company holds the Boston Elevated Fraternal Protective Association to be the true representative of its employees and has announced a willingness to discuss with it matters of mutual concern; but it refuses to discuss such affairs with committees from the men now on strike on the ground that those men have voluntarily left its employ and that on their committees there are men who have no connection with the company. The company has contended from the first that the men on strike represent only about 16 per cent of its employees and are not entitled to dictate to the other men.

On June 11 President Bancroft of the company addressed the following letter to a committee from the Boston Elevated Fraternal Protective Association the members of which complained that the men on strike were going from house to house among the loyal men visiting their wives and families and endeavoring to frighten them with threats.

"In reply to your question, I am glad to have the opportunity of saying that the company's position in regard to the present situation has not changed. We will not submit matters regarding the relation of our employees and ourselves to outside interference, and we shall continue to support in every way in our power our loyal employees whom you represent."

On June 13 it was decided to hold a parade in Boston on Sunday afternoon, June 16, followed by a mass meeting on the Common, the parade and meeting to be conducted under the direction of the central labor organization, the idea being to try to enlist the co-operation of other workers.

THIRD ANNUAL REPORT BOARD OF SUPERVISING ENGINEERS CHICAGO TRACTION

The Board of Supervising Engineers of Chicago has just issued its third annual report containing data of the board's activities and expenditures and a record of the more important engineering work accomplished, precedents established, standards developed and technical investigations carried out.

During the fiscal year ended Jan. 31, 1910, which this report covers, the Southern Street Railway Company accepted its traction ordinance and came within the board's jurisdiction, being consolidated, so far as operations were concerned, with the Chicago City Railway and represented on the board by its representative.

The period of rehabilitation work for the Chicago City Railway Company ended April 15, 1910. The work of the remaining companies stands as follows, all figured on the three-year basis:

	—Portion of Rehabilitation Completed—		
	Chicago Rys.	Calumet & South Chicago Ry.	Southern Street Ry.
Portion of rehabilitation period elapsed	66⅔	51	100
Per cent of completion of ordinance requirements:			
Track reconstruction completed	100	46	100
Cable track removed from streets	100	none	none
Electrical transmission system completed	80	70	100
New cars in operation	88	100	100
Carhouses, substations and shops	90	85	none

Tunnels under Chicago River:
Washington Street.—C. & N. W. Ry. station approach—50 per cent. River section and east approach—contract let and work progressing.
La Salle Street.—Entire construction—contract let.
Van Buren Street.—Conduit and drainage system—100 per cent.

The total cost of this rehabilitation work to date, together with appraised value of existing properties, is as follows:

Traction Valuation Commissions

Company	Valuation	Rehabilitation	Total
Chicago City Railway Co.	$21,000,000.00	$17,507,294.18	[illegible]
Chicago Railways Co.	29,000,000.00	22,851,308.97	51,851,308.97
Calumet & South Chicago Ry. Co.	5,000,000.00	1,931,278.82	6,931,278.82
Southern Street Railway Co.	775,000.00	465,095.99	1,240,095.99
Grand total	$55,775,000.00	$42,754,977.96	$98,529,977.96

Chapter 1 is devoted to a general summary of work executed by Boards Nos. 1 and 2 for the fiscal year ended Jan. 31, 1910. The executive organization of the Board of Supervising Engineers remained practically the same as during the previous years. Board No. 2 was organized in 1909 to govern the work of the Calumet & South Chicago Railway Company.

In carrying out its work the expenditures of the Board of Supervising Engineers during the year covered by the report aggregated $301,278.80, or 1.40 per cent of the actual construction cost supervised by it during the year. Since its establishment the expenses of the board have amounted to $980,677, or 1.56 per cent of the construction supervised. Owing to the rapid increase in capital for rehabilitation the city's share in net receipts has decreased in amount during the period covered by the report. After rehabilitation the board thinks that the rate of capital increase will become so much less than the rate of increase in earnings that the divisible net income of the companies will most probably increase year by year and accordingly the city's share will also increase. Although the city's share in the net receipts has decreased in percentage during the last three years, the total return to the public in the form of share and taxes has remained practically constant, at slightly under 11 per cent of the gross income. The total return to the company, including interest and the companies' share in the net receipts, has increased 3 per cent in the three years.

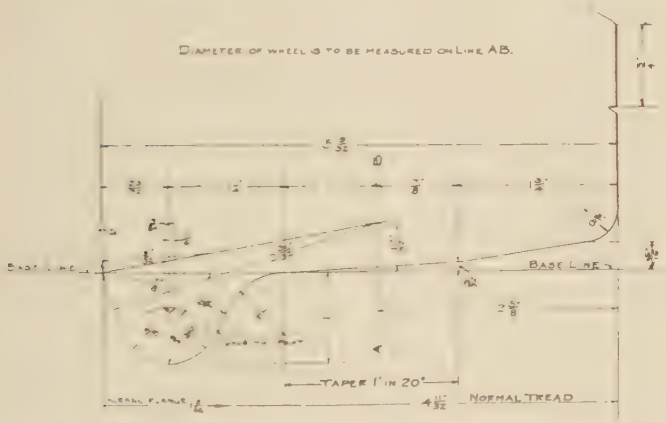
Chapter 3 is devoted to comparisons with other cities, and Chapter 4 to financial and statistical exhibits and schedules. In Chapter 5 is a list of the members and employees of the board. Chapters 6 to 13, inclusive, contain the detailed

reports of the different technical departments. The final chapters of the report contain digests of the various meetings of the board and the full text of the ordinances authorizing the Southern Street Railway Company to construct, maintain and operate a system of street railways in the streets of Chicago.

REPORT ON STEEL CAR WHEELS AT THE M. C. B. CONVENTION

The most important work that confronted the committee on car wheels at the M. C. B. convention was the subject of specifications, dimensions and tolerances for solid forged and rolled, rolled or cast-steel wheels for freight and passenger car service. The question of specifications for solid steel wheels was taken up with the manufacturers and with the railway companies using such wheels, but after a careful study of the subject the committee came to the conclusion that the art of manufacturing solid steel wheels was yet in process of development and no standard specifications in regard to quality of material or method of manufacture could yet be drawn. The committee, however, did recommend specifications governing the maximum variations allowed in new wheels. Specifications for cast-steel, one-rim wheels were not considered. The proposed specification governing dimensions and tolerances for solid wrought-steel wheels for freight and passenger car service follow:

1. Wheels should be furnished rough-bored and with faced hubs and have a contour of tread and flange as rolled or machined according to M. C. B. recommended practice (Exhibit G). They should conform to dimensions specified within the following tolerances:



Revised Profile of M. C. B. Steel Car Wheel (Exhibit G)

2. Height of Flange.—The height of flange should not be more than ⅛ in. over and must not be under that specified, or 1 in.

3. Thickness of Flange.—The thickness of flange shall not vary more than 1/16 in. over or under that specified.

4. Thickness of Rim.—The thickness of rim to be measured between the limit of wear groove and the top of the tread at the point where it joins the fillet at throat of flange. The thickness must not be less than 1¾ in., but may exceed this amount.

5. Width of Rim.—The width of rim shall not be more than ⅛ in. less nor more than ⅛ in. over that specified.

6. Limit of Wear Groove.—The limit of wear groove to be located as shown in Exhibit G, M. C. B. recommended practice.

7. Diameter of Bore.—The diameter of rough bore shall not vary more than 1/16 in. above or below that specified. When not specified the rough bore shall be ¼ in. less in diameter than the finished bore, subject to the above limitations.

8. Hub Diameter.—The hub diameter may be either 10 in. or 11 in. in diameter as specified, with a maximum variation of ⅛ in. above or below. The thickness of the wall of the finished bored hub shall not vary more than ⅜ in. at any two points on the same wheel.

9. Hub Length.—The length of hub shall not vary more than ⅛ in. over or under that specified.

10. Depression of Hub.—The depression of the hub must be made so that the distance from the outside face of the hub to the line AB shall not exceed 1 11/16 in. for wheels used on 5½-in. x 10-in. axles and under and 1 7/16 in. for wheels used on 6-in. x 11-in. axles.

11. Black Spots on Hub.—Black spots will be allowed within 2 in. of the face of the hub, but must not be of such depth that they will not bore out and give clear metal at finished size of bore.

12. Eccentricity of Bore.—The eccentricity between the tread at its center line and the rough bore shall not exceed 3/64 in.

13. Block Marks on Tread.—The maximum height of block marks must not be greater than 1/64 in.

14. Rotundity.—All wheels shall be gaged with a ring gage and the opening between the gage and tread at any one point shall not exceed 1/16 in.

15. Plane.—Wheel shall be gaged with a ring placed concentric and perpendicular to the axis of the wheel. All points on the back of the rim equidistant from the center shall be within a variation of 1/16 in. from the plane of the gage when so placed.

16. Tape Sizes.—Wheels shall not vary more than five tapes under nor nine tapes over the size called for.

17. Mating.—The tape sizes shall be marked in plain figures on each wheel. Wheels must be mated to tape sizes and shipped in pairs.

18. Gage.—Gages and tape used shall be M. C. B. standard as follows:

M. C. B. standard wheel circumference measure, Sheet 16-A.

Maximum flange thickness gage, Exhibit H.

Minimum flange thickness gage, Exhibit I.

M. C. B. recommended rotundity gage, Exhibit J.

M. C. B. recommended plane gage, Exhibit K.

M. C. B. recommended gage for measuring service metal, Exhibit L.

M.C.B. REPORT ON RULES FOR LOADING MATERIALS

The report of the standing committee for rules on loading materials recommended a number of changes. One is in relation to the method of loading lumber on flat cars. Another relates to the method of loading logs. In the latter case the committee recommended that the use of permanent short stakes and chains instead of the specified staking and wiring should be acceptable. Where the logs are loaded on flat or gondola cars with sides less than 30 in. high and the lading does not exceed 4 ft. in height measured from floor, and the lading is not loaded in pyramidal form, the stakes must be as high as the lading and must be tied together at the top with not less than eight strands, equal to four wrappings of good ⅛-in. diameter wire, and must be tight. Stakes must be sound hard wood, free from knots and of the dimensions specified in General Rule No. 12. If loaded to a height of more than 4 ft., opposite stakes must be bound together with wire at about one-third of the height above the car floor after one-third of the load has been placed on the car, and in such a manner that when the remaining load is placed on the car the wire will have a tendency to draw the tops of the stakes toward each other. The middle as well as the top wrappings of wire must consist of not less than ten strands, equal to five wrappings of good ⅛-in. diameter wire, and must be tight. Bearing-pieces may be placed between the lower and upper sections of the load to facilitate application of wire after all the

lading has been placed on the car. When the lading is in two piles not over 20 ft. in length and ends of piles are interlaced at the center of the car there must be not less than five pairs of stakes for total length of load. The ends of poles must extend not less than 18 in. beyond the center stake.

Some changes have also been recommended in reference to handling twin loads of flexible material where the shipment is light and can be handled safely without the use of blocking prescribed for full loads. The committee also presents a diagram showing the proper method of loading pipe 24 in. or more in diameter on flat cars. The bell ends should be set toward the center of the car to prevent slipping. Recommendations were also added to the methods of loading boilers and of carrying mounted wheels on open cars.

The Master Car Builders' Association elected the following officers for the ensuing year on Friday, June 14, at the Atlantic City convention: President, C. E. Fuller, assistant general manager, Union Pacific Railroad; vice-presidents, D. F. Crawford, general superintendent motive power Pennsylvania Lines West of Pittsburgh; M. K. Barnum, general superintendent motive power Illinois Central Railroad, and D. R. MacBain, superintendent motive power Lake Shore & Michigan Southern Railway; John S. Lentz, master car builder Lehigh Valley Railroad, was re-elected treasurer and Joseph W. Taylor was re-elected secretary.

C. E. R. ACCOUNTANTS' ASSOCIATION QUESTION BULLETIN

Query Box Bulletin No. 2 of the Central Electric Railway Accountants' Association was issued from the office of the association, Indianapolis, May 28, and contained answers to a number of questions. The first question related to the handling of waybills to and from prepay stations, and a variety of practices were reported. One answer referred the inquirer to the report of the interline accounting committee at Atlantic City in October, 1911.

The second question related to the disposition to be made of a subsidy voted by a county or by citizens in a town to the railway. Two answers were that it should be credited to the cost of road and equipment. One was that it should be credited to the cost of right-of-way; one that if in the form of right-of-way it should be credited to the cost of right-of-way, and if in the form of money it should be credited to the cost of road and equipment. A fourth suggestion was that it should be used to open a subsidy account to be transferred later to the surplus account or to "surplus reserved for sinking fund." According to another reply, Interstate Commerce Commission Bulletin No. 5 states that similar items should be handled through the income account.

Another question asked was as to the account to which cinders sold by a traction line should be credited. One reply was that the amount should be credited to miscellaneous earnings, three were that it should be credited to the expense account "fuel for power," and one was that it should be credited to miscellaneous power house expenses.

Another question related to the way in which the premium paid on the retirement of bonds under a sinking fund provision should be charged. The general conclusion was that it should be charged against surplus.

Another question related to the proper way of charging the time of the chief engineer of a power station who also does repair work and general supervision. The general conclusion was that time spent in general supervision should be chargeable to transportation and that in repair work to the department for which the repairs were done, provided the time so spent by the engineer was enough in amount to warrant such a division. One answer stated that Accounting Bulletin No. 7 of the Interstate Commerce Commission covered this question very thoroughly.

AN INGENIOUS DISAPPEARING SCAFFOLD USED FOR WASHING CARS

The mechanical department of the Chicago, South Bend & Northern Indiana Railway has recently installed an ingenious disappearing scaffold in its shops at South Bend, Ind. The scaffold support, which is shown in the accompanying illustration, consists of two sections. One is a 3-in. cast-iron flanged pipe, 7 ft. long, buried underground with the flange flush with the floor. Inserted in this 3-in. pipe is a 6-ft. section of 2½-in. wrought-iron pipe, provided with a cap and handle for raising or lowering. The 2½-in. pipes which form the legs of the scaffold are spaced on 11-ft. centers and are provided with slots for inserting a removable bracket made of ¾-in. round iron. The lower portions of these pipes are also provided with holes drilled on 6-in. centers to permit the insertion of the ¾-in. pins

Disappearing Scaffold Used in South Bend Shops

which support the scaffold at the desired working elevation. These pins are attached to the flanges of the 3-in. pipe by chains to prevent their being mislaid. The advantages of a scaffold support of this character are evident, in that it can be lowered to the floor level out of the way of any other work which it may be necessary to do beside a car, and yet is of a substantial, permanent construction.

In connection with the disappearing wash scaffold a very interesting and inexpensive installation has been made for heating the water used to wash the cars. This installation consists of an ordinary 12-barrel galvanized water tank supported on the lower cords of the roof trusses. This tank is supplied by water from the city water mains and the water supply is controlled by a floating automatic valve arrangement, similar to that used in a flush tank. The water in the tank is kept at about the boiling temperature by six 6-ft. sections of 1-in. pipe, supplied with steam from the high-pressure heating plant. C. E. Atkinson, master mechanic for the South Bend company, who is responsible for both the wash scaffold and water-heating installations, is of the opinion that much better results can be obtained by washing cars with hot water than with cold, in that it reduces the quantity of soap required and labor necessary to get a first-class job.

Exhibits at the Railway Conventions

Brief References to Exhibits of Interest to Electric Railways at Master Mechanics' and Master Car Builders' Conventions

The exhibits of manufacturers at the joint conventions, now being held at Atlantic City, of the Master Mechanics' and the Master Car Builders' Associations are even more elaborate than those of last year. There are 262 exhibitors this year, occupying a total of 83,507 sq. ft. of space, as against 245 exhibitors with 76,110 sq. ft. of space in 1911. In addition to the space occupied by booths and by the machinery exhibits, all of which were located on Young's Million-Dollar Pier, space for exhibition cars is provided on the tracks on Mississippi Avenue near the convention hall. Among the exhibitors of devices or products applicable to the electric railway field are the following:

Acme Supply Company, Chicago, Ill.—Vestibule diaphragms; vestibule curtains; diaphragm attachments; weatherproof windows; interior car curtains; steel doors; steel ladders; Chanarch car flooring; weatherproof window posts.

Ajax Manufacturing Company, Cleveland, Ohio—Ajax scrap reclaiming rolls and forgings produced on Ajax forging machines.

American Abrasive Materials Company—Materials used in manufacture of feralun, the product of treatment of bauxite in an electric furnace; feralun heat resistant castings; test plates showing comparison of feralun and iron, in resisting flame; feralun abrasion castings; feralun anti-slip treads for stairways.

American Brake Company, St. Louis, Mo.—Westinghouse booth.

American Brake Shoe & Foundry Company, Mahwah, N. J.—Brake shoes for freight equipment and electric railway equipment; brake heads and keys.

American Brass Company, Coe Brass Company Branch, Ansonia, Conn.—Extruded and pressed brass shapes for car trimmings.

American Car and Foundry Company, New York, N. Y.—Model steel underframe; folding pouch rack for postal cars; photographs and blue prints of cars.

American Mason Safety Tread Company, Boston, Mass.—Mason safety treads, lead filled; Empire safety treads, carborundum filled; Stanwood treads for car steps; Karbolith composition flooring.

American Nut & Bolt Fastener Company, Pittsburgh, Pa.—Bartley nut and bolt fasteners, Bartley self-locking nut and bolt fasteners.

American Roll Gold Leaf Company, Providence, R. I.—Roll gold leaf; roll aluminum leaf and gold florentine metal leaf.

American Steel Foundries, Chicago, Ill.—Cast steel products; Vulcan cast steel side frames; Vulcan cast steel brake beams; Samson bolster; Simplex couplers; Hercules and Ajax brake beams; Susemihl roller side bearings; Davis wheels; springs and miscellaneous castings.

American Tool Works Company, Cincinnati, Ohio—Motor-driven lathes, shapers and drill presses in operation.

American Vanadium Company, Pittsburgh, Pa.—Vanadium steel forgings and castings, vanadium tool steels and vanadium alloys.

Automatic Ventilator Company, New York, N. Y.—Miniature working models of the "Automatic" car ventilator, models of several types of self-acting intake-and-exhaust car ventilators, including those meeting requirements of the postal department.

Baker Car Heater Company, Detroit, Mich.—One No. 9 steel shell fireproof heater, one No. 1-C hot-water heater, one No. 3-P forced ventilation hot-air heater, one No. 3-K electric forced ventilation hot-air heater.

Baush Machine Tool Company, Springfield, Mass.—One hydro-pneumatic radial drill in operation.

Berry Brothers, Limited, Detroit, Mich.—Varnish panels, varnish gums, shellacs, japans and railway varnishes.

Best Manufacturing Company, Pittsburgh, Pa.—Gate valves, globe valves, flanged fittings, bends and pipe joints and flexible joints.

Best, W. N., New York, N. Y.—Oil burners, oil furnaces, oil regulating cocks.

Bethlehem Steel Company, South Bethlehem, Pa.—Tool steels; Bethlehem structural steel shapes; standard high-speed steel tools developed by Taylor-White; drop forgings; steel, iron and brass castings; alternating stress testing machines in operation; Bristol critical point furnace in operation; metallographic instruments in operation; tail sections; forged steel hydraulic jacks.

Bettendorf Axle Company, Bettendorf, Iowa—Steel underframes for cars with needle beams carried across car through webs of center sills; car-trucks with side frames and journal boxes cast together in one piece of cast steel; demonstrations of dismantling and assembly of this truck; variable load truck brake.

Boss Nut Company, Chicago, Ill.—Boss nut locks.

Bowser & Company, Inc., Ft. Wayne, Ind.—Standard self-measuring oil pumps; tank and oil pump combined; paint oil outfit; power pump; automatic registering measure; automobile filling station; oil filtration and circulating outfit.

Brunix Manufacturing Company, Philadelphia, Pa.—Journal box packing; wiping cloths.

Buckeye Steel Castings Company, Columbus, Ohio.—Complete cast-steel 70-ton truck, truck bolsters, solid cast-steel truck side-frames, journal boxes and couplers.

Buffalo Brake Beam Company, New York, N. Y.—Brake beams; automatically adjustable brake heads, truss and solid brake beams for all classes of cars.

Bullard Machine Tool Company, Bridgeport, Conn.—One 42-in. vertical turret lathe in operation.

Cambria Steel Company, Johnstown, Pa.—Cambria special and "Coffin Process" axles; "100 per cent" rail joints with long angle bar support under head of rail, giving full rail strength at the joint; Morrison guard rails with offset head.

Carborundum Company, Niagara Falls, N. Y.—Carborundum and Aloxite wheels, Aloxite cloth, garnet paper and carborundum safety devices.

Carey & Company, Philip, Cincinnati, Ohio.—Asbestos and magnesia material for railway use.

Carnegie Steel Company, Pittsburgh, Pa.—Solid rolled steel wheels; slick gear blank and cut gear for motors; bent Carnegie toughened freight car axle; vanadium steel locomotive spring, axles and test pieces; nickel-plated sections of structural shapes.

Chase & Company, L. C., Boston, Mass.—Car seat coverings; Goat brand plain mohair plush, frieze plush, friezette and Chase leather.

Chicago Pneumatic Tool Company, Chicago, Ill.—Pneumatic and electric tools.

Chicago Railway Equipment Company, Chicago, Ill.—Brake beams of the "PC" Creco, "EL" Creco, Diamond Special, Diamond, Drexel, National Hollow, Kewanee, Reliance, Sterlingworth, Ninety-six, Monarch and special types; Monitor bolsters; Creco roller side bearings; brake slack adjuster; journal box and lid; automatically adjustable brake head.

Chicago Varnish Company, Chicago, Ill.—Finished panels showing "Ce-Ve" process of painting cars.

Chisholm & Moore Manufacturing Company, Cleveland, Ohio—Chain hoists, I-beam trolleys.

Coe Manufacturing Company, Providence, R. I.—Coe's ribbon gold leaf and Coe's gilding wheels.

Colonial Steel Company, Pittsburgh, Pa.—Illuminated photographs showing the manufacturing of steel; samples of different tools made from Colonial steel.

Commonwealth Steel Company, St. Louis, Mo.—Photographs, drawings and catalogues showing combined platforms and double body bolsters, four and six-wheel trucks, needle beams, end sills, truck center bolsters, truck center frames, Commonwealth transom draft gear, separable body bolsters.

Consolidated Car Heating Company, New York, N. Y.—Pressure traps, vapor traps, steam couplers, end valves, admission valves, Thermostat, electric heaters, switches, resistances.

Crane Company, Chicago, Ill.—Special railroad fittings, automatic stop and check valves, special valves for creosote wood-preserving plants, steel valves and fittings for superheated steam, Crane tilt steam traps, hydraulic valves, special assortment of brass globe and angle valves for railroad service, gate valves.

Crosby Steam Gage & Valve Company, Boston, Mass.—Special steam gages; hydraulic press recorder with continuous chart.

Crucible Steel Company of America, Pittsburgh, Pa.—Steel products.

Curtain Supply Company, Chicago, Ill.—"Rex" all metal rollers, curtain materials, friction rollers, steel sash balance, "CSCO" curtain release handles.

Damascus Brake Beam Company, The, Cleveland, Ohio—Brake beams of both solid and truss type; adjustable brake heads; forged steel fulcrums.

Davis Boring Tool Company, St. Louis, Mo.—Full line of the Davis expansion boring tools.

Davis-Bournonville Company, New York, N. Y.—Oxy-acetylene welding and cutting apparatus; complete welding and cutting equipment; acetylene and oxygen generating and compressing plants; demonstrations of cutting dies out of high-carbon steel, welding metal on to broken brake cylinders and motor shells.

Davis Solid Truss Brake Beam Company, Wilmington, Del.—Brake beams; solid steel brake shoe backs; Universal air brake combined auxiliary reservoir and cylinder; brake beam deflectometer and special appliance for testing brake beams; rolling center support for truss-type brake beams.

Dearborn Drug and Chemical Works, Chicago, Ill.—Reception booth.

Deforest Sheet & Tin Plate Company, Niles, Ohio.—Lohmannized products and Deforest convolute reinforcement.

Detroit Lubricator Company, Detroit, Mich.—Sight-feed Bullseye lubricators.

Dieter Nut Company, New York, N. Y.—Lock nuts.

Dixon Crucible Company, Jos., Jersey City, N. J.—Graphite products for railway use.

Dressel Railway Lamp Works, New York, N. Y.—High candle-power headlights; combination oil and electric lamps; tail lamps; platform marker lamps; automatic caboose lamps; electric, acetylene and oil gage lamps.

Duff Manufacturing Company, The, Pittsburgh, Pa.—Barrett track jacks; Duff ball-bearing screw jacks and forged steel hydraulic jacks.

Duntley Pneumatic Tool Company, Chicago, Ill.—Chippers; riveters and air drills.

Du Pont de Nemours Powder Company, E. I., Wilmington, Del.—"Fabrikoid," an artificial leather for coach curtains and seats.

Durbin Automatic Train Pipe Connector Company, St. Louis, Mo.—Automatic air and steam hose coupling and train telephone system; automatic safety car coupler.

Eagle Glass & Manufacturing Company, Wellsburg, W. Va.—Oilers; shop torches; supply cans; grease and dope buckets; wrecking torches, etc.

E. D. E. Company, Chicago, Ill.—Insulation for steel cars; track insulation for electric roads.

Edison Storage Battery Company, Orange, N. J.—Five exhibition boards showing the assembly and parts of the various sized cells made by this company; car lighting battery equipment; short-circuit test on a fully charged Edison battery, in which normal discharge of 90 amp is raised to 1500 amp for half-hour periods without damage to the cell.

Edwards Company, The O. M., Syracuse, N. Y.—Window fixtures; extension platform trap doors; all metal shade rollers; all metal sash balances; padlocks.

Electric Controller and Manufacturing Company, Cleveland, Ohio—Lifting magnet in operation; automatic controllers in operation; electric brakes; crane controllers; circuit breakers; magnetic switches; protective panels.

Electric Storage Battery Company, Philadelphia, Pa.—"Hycap-Exide" storage batteries for car lighting, signal and street car service.

Emery Pneumatic Lubricator Company, The, St. Louis, Mo.—Emery brake cylinder lubricant and pneumatic lubricators for air brake equipment.

Enterprise Railway Equipment Company, Chicago, Ill.—Side dump and bottom dump cars for bulk freight.

Fairbanks Company, The, New York, N. Y.—Railroad track scales; platform scales; valves; dart unions and flanges.

Fairbanks, Morse & Company, Chicago, Ill.—Gasoline section man's motor car.

Forged Steel Wheel Company, New York, N. Y.—Forged steel wheels.

Forsyth Brothers Company, Chicago, Ill.—Pressed steel unit sections for sides of cars; metal sash and doors; sash attachments.

Ft. Pitt Malleable Iron Company, Pittsburgh, Pa.—Malleable iron castings.

Franklin Manufacturing Company, Franklin, Pa.—Asbestos supplies of all natures for railroad use; asbestos "Carline" cotton and wool waste; perfection journal box packing.

Frost Railway Supply Company, Detroit, Mich.—Detroit Metal Weather Strip, made of spring brass which expands between the sash and the stops.

Garlock Packing Company, The, Palmyra, N. Y.—Special packings for accumulators, compressors and general shop purposes.

General Electric Company, Schenectady, N. Y.—Motors, air compressors, controllers; rheostats; breast drills; steam and air flow meters; battery truck crane; ozonator; soldering irons; fans; headlights; arc lamps; 5-kw Curtis turbine; mercury arc rectifiers; cloth and steel pinions; ammeters; railway signal volt ammeter; cable display cabinet.

General Railway Supply Company, Chicago, Ill.—Steel car sheathing; National steel trap doors; Perfection sash balances; Resisto insulation; Imperial car window screens; Flexolith composition flooring; National vestibule curtain catches; Eclipse deck sash ratchets.

Gilbert & Barker Manufacturing Company, Springfield, Mass.—Storage tanks with measuring and non-measuring pumps for the storage of lubricating and heavy paint oils, and specialties used in the handling of gasoline and other oils; portable tank and measuring pump mounted on wheels.

Gold Car Heating & Lighting Company, New York, N. Y.—Gold's combination pressure and vapor system; straight vapor system; thermostatic temperature regulator; new ideal pressure regulator; cyclone ventilators; heat storage system for refrigerator cars; wedge lock steam hose couplers; electric heaters.

Goldschmidt Thermit Company, New York, N. Y.—Thermit

of various kinds and appliances; metals and alloys produced by the alumino-thermic process; specimen pipe welds and apparatus for making same; motion pictures and transparencies to show the operations done by the Thermit process.

Gould Coupler Company, New York, N. Y.—Gould "Simplex" system of electric train lighting; various styles of couplers.

Gould & Eberhardt, Newark, N. J.—New high power type patent shaper arranged with adjustable speed motor, with automatic electrical starting and braking device; sectional frame and inside gearing of 16-in. shaper showing the interior construction.

Greene, Tweed & Company, New York, N. Y.—Palmetto packing, round and square, for high steam pressures; Manhattan packing for low steam and hydraulic pressures; Favorite reversible ratchet wrench.

Greenlaw Manufacturing Company, The, Boston, Mass.—Flexible metallic hose for steam, air or oil; flexible joints.

Griffin Wheel Company, Chicago, Ill.—Car wheels.

Grinden Art Metal Company, Brooklyn, N. Y.—Hollow steel car doors; cold drawn steel mouldings.

Grip Nut Company, Chicago, Ill.—Grip nuts with distorted threads.

Halcomb Steel Company, Syracuse, N. Y.—Hand tools and springs of special steels.

Hale & Kilburn Company, Philadelphia, Pa.—Improved "Walkover" car seats, parlor car chairs, reclining chairs for cars, steel car interior finish.

Hartshorn Company, Newark, N. J.—Spring rollers for car curtains, vestibules and sash balances.

Hewitt, H. H., New York, N. Y.—Car trucks; flexible trucks with side frames pivoted on ends of transoms.

Heywood Brothers and Wakefield Company, Wakefield, Mass.—Seats for railway coaches, including new type of pressed steel armrest, also seats for interurban and city cars.

Home Rubber Company, Trenton, N. J.—Rubber mechanical goods.

Hubbard & Company, Pittsburgh, Pa.—Railroad track tools, track shovels, pole line hardware, Pierce insulator pins and brackets, standard and special washers, steel stampings.

Hunt Company, C. W., West New Brighton, N. Y.—Coal handling machinery, motion picture of cargo cranes, P. R. R. at Greenville, N. J.; automatic railway model, industrial railway, train of cars; coaling station model, gravity bucket conveyor model, hoisting and transmission rope, photos of coal-handling plants and machinery.

Independent Pneumatic Tool Company, Chicago, Ill.—Pneumatic hand tools.

Industrial Requirements Company, Philadelphia, Pa.—Leather material.

International Oxygen Company, New York, N. Y.—I. O. C. system generators for producing pure oxygen and hydrogen; oxy-hydrogen torches; oxy-acetylene torches; acetylene generators; oxygen, hydrogen and acetylene regulating and reducing valves.

Jenkins Bros., New York, N. Y.—Brass, iron and steel valves of all types for power plants, shops and heating systems; sheet packing, pump valves and other mechanical rubber goods.

Johns-Manville Company, H. W., New York, N. Y.—Steel passenger car insulation; waterproofing and mastic samples; electrical materials; Vitribestus pipe coverings; high and low pressure pipe coverings; asbestos roofing; ventilators; fire resisting cements; asbestos car sill covering; friction tapes and splicing compounds; gaskets; indurated fiber conduit for electric wiring; Sanitor toilet seats.

Jones & Laughlin Steel Company, Pittsburgh, Pa.—Open hearth and Bessemer steel; steel sheet piling; power transmission machinery; various wire products, railroad spikes, light rails and connections; structural steel beams, angles, channels.

Joyce-Cridland Company, Dayton, Ohio.—Double-pawl rack and ratchet jacks; extra high lift jacks for car shops; low jacks for wrecking, and light weight emergency jacks of especially compact design to be carried on street railway cars.

Keyoke Railway Equipment Company, Chicago, Ill.—Reception booth.

Keystone Drop Forge Works, Chester, Pa.—A full line of complicated drop forgings.

Keystone Lubricating Company, Philadelphia, Pa.—Lubricants.

Knight Pneumatic Sander Company, Huntington, Ind.—Sanders for interurban equipment, pneumatically operated and capable of adjustment.

Landis Machine Company, Waynesboro, Pa.—Double head motor driven bolt cutters; pipe threading machines.

Lehon Company, Chicago, Ill.—Roofing and insulating papers.

Lucas Machine Tool Company, Cleveland, Ohio—"Precision" horizontal boring, drilling and milling machine.

Lunkenheimer Company, The, Cincinnati, Ohio—Regrinding, angle and cross valves; globe angle and cross valves; non-return boiler stop valves; gate valves; pop valves; lubricators; stop cocks, etc.

McConway & Torley Company, The, Pittsburgh, Pa.—Buhoup flexible truck with double Tee-shaped transom resting on auxiliary springs in truck side-frames, permitting independent motion in vertical plane of the two truck-sides and preventing strain from uneven track; automatic couplers; steel castings.

McCord & Company, Chicago, Ill.—McCord malleable iron and vanadium cast iron journal boxes having lids in which the usual pin at the top is replaced by a pair of lugs cast on the lid, the latter being held in place by a spiral compression spring; draft gear; spring dampener.

McCord Manufacturing Company, Chicago, Ill.—Flexible weather stripping; metal weather stripping; gravity wedging sash locks and racks; locks; sash balances; deck sash ratchets; copper insulated adjustable sash; sash lifts; drawn metal moldings.

McGraw Publishing Company, New York, N. Y.—Copies of Electric Railway Journal, Electric Railway Dictionary, Electric Railway Directory, Electric Railway Manual, Electrical World, Engineering Record. Views of offices and printing plant.

Manning, Maxwell & Moore, Inc., New York, N. Y.—Lathes, shapers, milling machines, gear cutters and crank planers, heading machines.

Manufacturers' Exhibit of Railway Supplies, Chicago, Ill.

Massachusetts Mohair Plush Company, Boston, Mass.—Car seats; samples of all qualities of plain and figured plushes.

Midvale Steel Company, The, Philadelphia, Pa.—Steel-tired and solid rolled steel car wheels.

Mid-Western Car Supply Company, Chicago, Ill.—Steel underframe with combination body and truck bolster, the truck bolster being made up of two members, one of which passes below the center sills and carries the center plate. The other member or the one which is in compression is bent up to pass over the center sills. Anderson friction draft gear.

Milburn Company, The Alexander, Baltimore, Md.—Oxy-acetylene welding and cutting outfit, portable acetylene construction, wrecking and inspection lights.

Mudge & Company, Burton W., Chicago, Ill.—Garland car ventilators.

Murphy Equipment Company, New York, N. Y.—All-steel gondola car for general service with floor which can be dropped in sections to dump load.

Nathan Manufacturing Company, New York, N. Y.—Injectors; lubricators; steam fire extinguisher; Klinger water gages; Hart globe and angle valves.

National Lock Washer Company, The, Newark, N. J.—National lock washers; car curtains; curtain fixtures; sash locks; sash balances.

National Malleable Castings Company, The, Cleveland, Ohio—Couplers; malleable iron castings.

National Tube Company, Shelby Steel Tube Company, Pittsburgh, Pa.—Boiler tubes; Kewanee unions; regrinding valves.

Nelite Works of General Electric Company, Cleveland, Ohio—Complete line of lighting units for all types of car lighting service and lighting units for all classes of industrial and shop lighting, office, station, waiting-room and platform lighting.

Newhall Engineering Company, George M., Philadelphia, Pa.—Photographs of wrecking, locomotive and transfer cranes, pile drivers, etc., built by Industrial Works, Bay City, Michigan; photographs of Case electric overhead traveling cranes.

Newton Machine Tool Works, Philadelphia, Pa.—Internal cutting cold saw, the saw being made of annular disk with teeth on the inner periphery.

New York Air Brake Company, The, New York, N. Y.—Exhibition rack representing the electro-pneumatic brake equipment for a locomotive and ten cars.

Nickel Chrome Chilled Car Wheel Company, Pittsburgh, Pa.—Nickelized, chilled car wheels.

Niles-Bement-Pond Company, New York, N. Y.—Niles new model car-wheel borer, Pond reversing motor drive planer.

Norton Company, Worcester, Mass.—Complete display of Norton grinding wheels.

Norton Grinding Company, Worcester, Mass.—Norton grinding machine for wheels and axles in operation; grinding machines and parts equipped with protecting devices.

Norton, Inc., A., Boston, Mass.—Various types of lifting jacks.

Oxweld Acetylene Company, Chicago, Ill.—Oxy-acetylene and oxy-hydric welding apparatus in operation cutting metal 24 in. thick; a demonstration of welding steel.

Pantasote Company, The, New York, N. Y.—Pantasote car curtains and upholstery; Agasote headlinings and interior trims for passenger cars.

Pease Company, The, C. F., Chicago, Ill.—Pease "Peerless" blue printer with automatic washing and drying machine; Pease direct blue line equipment; Simplex blue print paper coating machine; motor driven trimming table.

Pittsburgh Steel Foundry Company, Pittsburgh, Pa.—Two cast steel truck side frames interlocking into cast steel journal boxes with an interlocking cast steel spring plank.

Pneumatic Jack Company, Inc., Louisville, Ky.—Tandem cylinder pneumatic jacks; car and journal jacks.

Pocket List of Railroad Officials, The, New York, N. Y.—Pocket List of Railroad Officials.

Pressed Steel Car Company, New York, N. Y.—Photographs of product in booth.

Pyrene Manufacturing Company, New York, N. Y.—Pyrene fire extinguisher in operation on electric arcs; different styles of Pyrene extinguishers.

Railway Age Gazette, New York, N. Y.—Publishers of the Railway Age Gazette, American Engineer and Railway Journal, Signal Engineer, Daily Railway Age Gazette and books on the subject of steam transportation.

Railway List Company, The, Chicago, Ill.—Railway Master Mechanic Monthly Official Railway List; Railway Engineering and Maintenance of Way.

Railway Materials Company, Chicago, Ill.—Steel back brake shoes and Ferguson shop furnaces.

Railway Utility Company, Chicago, Ill.—Exhaust ventilators; intake ventilator and air washer; thermostatic control of car heating with steam, electric and hot water systems; electric vacuum car cleaners, completely self-contained.

Railway & Engineering Review, Chicago, Ill.—Railway newspapers.

Restein Company, Clement, Philadelphia, Pa.—Steam hammer packing; hand hole and man hole gaskets.

Rochester Germicide Company, Rochester, N. Y.—Disinfectants; perfection drinking fountains; liquid soap and urns; sanitary paper towels; sanitary supplies.

Rubberset Company, Newark, N. J.—General line of Rubberset paint brushes and products of the Rubberset Company.

Scarrett-Comstock Furniture Company, St. Louis, Mo.—Coach seats; reclining chairs for coaches.

Scullin-Gallagher Iron & Steel Company, St. Louis, Mo.—Six-wheel passenger truck frame; trucks showing types of truck side frames with divided journal box; double body bolster.

Sellers & Company, Wm., Incorporated, Philadelphia, Pa.—Drivers as used upon face plates and turret rest of extra high power car wheel lathe; hangers, couplings, bearings for the transmission of power.

Sprague Electric Works of the General Electric Company, New York, N. Y.—Steel armored air brake, car heating and shop hose; hose fittings; flexible steel conduit; Greenfielduct rigid conduit; outlet boxes and conduit fittings; electric fans and hoists.

Standard Car Truck Company, Chicago, Ill.—Flat car equipped with roller bearing lateral and radial motion trucks; Barber roller center plate.

Standard Coupler Company, New York, N. Y.—Standard steel couplers; Sessions-Standard friction draft gears.

Standard Roller Bearing Company, Philadelphia, Pa.—Roller bearing car journal boxes, assembled and disassembled; steel balls; journal roller bearings; standard taper roller bearings; roller thrust bearings; grooved ball end thrust bearings.

Standard Steel Car Company, New York, N. Y.—Reception booth.

Steel Specialties Company, Boston, Mass.—Worth wedge washer or nut safe-guard.

Storrs Mica Company, Owego, N. Y.—Mica lantern globes; Thompson indestructible hose clamp.

Street Railway Supply Company, Chicago, Ill.—"Huntoon brake beams," standard M. C. B. No. 1 and No. 2 freight beams; standard passenger and tender beams and beams for "high speed" and P. C. air brake equipment; Perry roller side bearings for passenger, freight and interurban cars; Perry-Hartman self-centering anti-friction radial truck.

Symington Company, The T. H., Baltimore, Md.—Symington journal boxes, Farlow draft gear.

Templeton, Kenly & Company, Ltd., Chicago, Ill.—Coach and truck jacks.

Topping Brothers, New York, N. Y.—Double-motion ball bearing jacks.

Transportation Utilities Company, New York, N. Y.—Vestibule diaphragms, curtains, diaphragm attachments, weather-proof windows, interior car curtains, Chanarch car flooring, weather-proof window posts.

Union Spring & Manufacturing Company, Pittsburgh, Pa.—Coil and elliptic springs; pressed steel box lids; steel castings; Kensington all steel journal boxes; pressed steel spring plates.

United States Metal Products Company, New York, N. Y.—Steel doors, trim and sash for steel coaches; car seats.

Valentine & Company, New York, N. Y.—"Valspar," a waterproof varnish; a system of car painting.

Van Dorn & Dutton Company, Cleveland, Ohio.—Portable electrically operated drills and reamers.

Virginia Equipment Company, Toledo, Ohio—Journal box dust guards.

Vixen Tool Company, Philadelphia, Pa.—Vixen files with curved teeth.

Ward Equipment Company, New York, N. Y.—Car heating

apparatus; passenger car ventilators; yard plugs and car receptacles for charging storage batteries on electrically lighted cars; Unotherms.

Warner & Swasey Company, The, Cleveland, Ohio—Universal hollow hexagon turret lathe.

Watson-Stillman Company, New York, N. Y.—Reception booth.

West Disinfecting Company, New York, N. Y.—Disinfectants and disinfecting appliances; West liquid soap dispensers; fumigating apparatus.

Western Railway Equipment Company, St. Louis, Mo.—Automatic brake adjuster; steel carline; brake jaws; pipe clamps.

Westinghouse Air Brake Company, Pittsburgh, Pa.—Reception booth.

Westinghouse, Church, Kerr & Company, New York, N. Y.—Photographs showing the design of machine shops.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Reception booth.

Westinghouse Machine Company, The, East Pittsburgh, Pa.—Reception booth.

Wheel Truing Brake Shoe Company, Detroit, Mich.—Abrasive brake shoes.

Williams Company, Inc., G. H., Cleveland, Ohio.—Buckets for steam shovels.

Wilmarth & Morman Company, Grand Rapids, Mich.—Surface grinders; wet tool grinders; New Yankee drill grinders; cutter and reamer grinders.

Wilson Remover Company, New York, N. Y.—Varnish and paint removers.

Yale & Towne Manufacturing Company, The, New York, N. Y.—Chain blocks; electric hoists; trolleys; special hoisting devices; signal padlocks; indicator padlocks.

INTERSTATE COMMERCE COMMISSION REPORT ON BLOCK SIGNALS

The report on block signals on the railways of the United States compiled by the block signal and train control board of the Interstate Commerce Commission has just been published. According to the report, the total length of steam railroad in the United States operated under the block system on Jan. 1, 1912, was 76,409.7 miles. Of this total, 20,334.9 miles were automatic and 56,074.8 miles were manual. There was an increase of 2623.4 miles in the length of road covered by the automatic block system and an increase of 2517.2 miles in the length of road covered by the manual block system over the figures shown in the bulletin of Jan. 1, 1911. The total increase in miles of road operated under the block system during the year was 5140.6 miles. The number of companies using alternating current in signal and operating circuits and in track circuits is reported as fourteen, for the most part companies operating electrical trains. The largest mileage of these is that of the Illinois Traction, 76 miles. Tables are appended of the kinds of block signals in use, the lines so equipped and the number of miles of track on which the telegraph and telephone are used in transmitting train orders. The telegraph is used on 169,400 miles and the telephone on 58,584 miles.

A new system of separating oil from exhaust steam is described in a recent issue of the *Engineer* of London. It consists of a series of slightly curved plates standing vertically in a box through which the steam is passed. Each plate has four or five vertical baffles on the concave side. The plates are stacked close together, and their slight curvature, while sufficient to project oil and water in the steam against them, is not sufficient to cause any great amount of back pressure. An efficiency test is reported in which only 3/10 of 1 per cent of the original oil fed in the centers passed through the separator to the condenser.

COMMUNICATIONS

THREE-POINT SUSPENSION WITH STEEL WIRE

New Haven, Conn., June 10, 1912.

To the Editors:

In the Electric Railway Journal for June 8 there occurs an interesting article entitled "The Use of Steel Trolley Wire," by "A Line Engineer." The comment is made that the Connecticut Company suspension, which is three points in 150 ft., "does not have the same flexibility as on the other roads."

I find it a little difficult to understand how 50 ft. of No. 0000 steel wire can have greater rigidity when suspended at the ends only than the corresponding 50 ft., which has placed upon it within those limits additional loads such as hangers, and, in the case of the New York, New Haven & Hartford Railroad, five substantial rigid clamps, a line of No. 0000 copper and five heavy triangular frames rigidly connected to two heavy messenger cables. As a matter of fact, the slight increased wear on the Connecticut Company steel trolley over copper is apparently due not to any question of flexibility or rigidity but to the fact that with wheel operation there is an abrasive action from the iron oxide which is fed into the contact point by the wheel size, whereas in the case of a pantograph a much larger proportion of oxide is blown away.

Charles Rufus Harte,
Assistant Engineer, New York, New Haven & Hartford Railroad.

PAYMENT OF BARCROFT APPRAISAL CLAIMS

Detroit, Mich., May 22, 1912.

To the Editors:

In your edition of May 18, page 848, an item appeared with the following caption: "Payment of Last of Barcroft Appraisal Claims Urged in Detroit." The statement as made places an unjust inference on the appraisal committee and myself. The facts are, the City Council authorized the payment of $17,500 on Jan. 16, 1910, for this street railway work. Of this amount only $10,500 was given to the appraisal committee and it was not sufficient to pay all the bills.

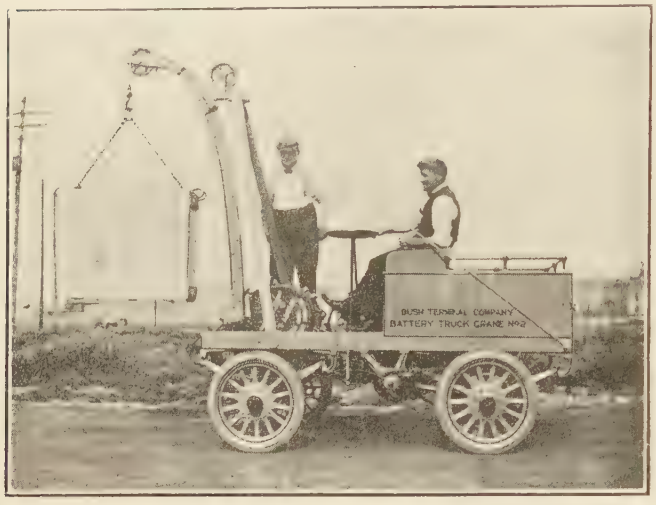
On April 5, 1910, bills for the printing of the report and the balance of expenses (not salaries as stated) were, after being approved by himself, submitted to the Mayor by the appraisal committee in the following language: "We heartily approve the above items and recommend the paying of same." The Mayor transmitted the bills to the Common Council on April 5, 1910. Later at the request of the acting chairman of the appraisal committee and myself the attention of the Mayor was called to the fact that these bills had not been paid. On Jan. 10, 1911, the last session of the Common Council of 1910, the Mayor sent a letter to the Council urging that it take up the matter and order an early settlement of the accounts. This communication was referred to the committee on franchises.

Under date of Dec. 22, 1911, the City Clerk states as follows:

"The Journal of the Common Council shows no action was ever taken by the committee, according to the record of the Council proceedings." This must make it plain that the matter has lain dormant. The action Mr. Boyer has taken, either to have the city pay these bills or have the amount contributed by the members of the committee of fifty, who are legally responsible for them, has been taken at my request, and after consultation with members of the appraisal committee. The bills were submitted as promptly as received, were approved by all persons and bodies, but the matter has lain in the archives of one of the Council committees ever since. Frederick T. Barcroft.

BATTERY TRUCK CRANE

The accompanying illustration shows a storage-battery truck crane designed especially for shops, freight houses and terminal stations, and built by the General Electric Company for the Bush Terminal, New York. It is said that the machine earned per year 288 per cent of its first cost over the most effective means of transferring freight previously used in that terminal. The crane hook is raised



Battery Truck Crane

and lowered by a 1-ton hoist operated from the vehicle battery. It has a maximum drawbar pull of 2000 lb. The battery has forty-four cells, each with thirteen plates, and a capacity of 168 amp-hr. The motor is a GE-1026. The weight of the car complete with hoist is 5000 lb. For the transfer of larger quantities of miscellaneous package freight over greater distances than 400 ft. the truck crane is used as a car to tow trailers in trains of about four cars.

CARE OF VARNISHED PARTS

When the wood on a car has been varnished over for several years without cleaning and each annual coat has been applied on top of a dirty and cracked surface the final result is most unsightly. On a number of electric railways this condition is apparently considered to be unavoidable, yet it is easily overcome. There are a number of reasonably reliable methods of removing old varnish which can be used. One way, which is applicable to the removable trim, such as the sash, seat backs, etc., is to put it in a tank full of the varnish remover, or else the parts may be painted thickly in place with the chemical remover. After the old varnish has been brushed off a new coat can generally be applied without any additional scraping or sand-papering, and a bright finish will be produced on the wood equal to that found in a brand new car. When the varnished parts have been allowed to go for eight or ten years without cleaning, but with yearly coats of varnish applied to the old surface, the ordinary varnish remover will not cut the accumulated covering of varnish and dirt. However, ammonia will do so, and if it is applied carefully it can be made to produce satisfactory results. Ammonia will tend to eat into the surface of any wood with which it comes in contact so that its application must be watched with some care, and the softened varnish should be removed as fast as it is killed, but this does not make the process necessarily costly or difficult. An old car whose interior is in rather shabby condition can actually be made to have a very presentable appearance if a small amount of the woodwork is renovated in this way and then finished with a bright clean varnish. It is work which is not expensive, and while the financial returns from improved appearance of rolling stock are indefinite and impossible to express in dollars and cents they are usually sufficient to be worth the expense.

GAS-ELECTRIC CAR FOR FRISCO LINE

An account of the orders placed for seventeen General Electric gas-electric motor cars for service on the Frisco System was published in a recent issue of this paper. A view of one of these cars, which has just been completed, is published herewith. The car is of the standard General Electric type with all-steel construction, except the interior finish. The frame consists of steel I-beams and channels, and steel plates form the outside sheathing. The underfloor of the car is of wood, sheathed with sheet iron on the lower side. Between this and the floor proper a heavy felt lining is inserted and the car sides are also interlined with felt. In general, the interior trim is of mahogany and the ceiling is sheathed with composite board. The seats are long enough to accommodate three persons and are covered with friezette plush in the passenger compartment and with leather in the smoking room.

The generating unit is located above the floor line of the cab and consists of an eight-cylinder, four-cycle gas engine of the "V" type, direct-connected to a 600-volt, commutating-pole electric generator, designed to meet the special conditions the service demands. The starting of the engine is effected by compressed air taken from the main reservoirs of the air-brake system, which are built with surplus capacity for this purpose. The main air compressor is driven from the crank shaft of the main engine and is fitted with an automatic governor which maintains a constant pressure. The engine can rotate at normal speed, irrespective of the speed of the car. An auxiliary equipment is also provided consisting of a two-cylinder, four-cycle gas engine, direct-connected to a single cylinder air compressor and lighting generator. The function of this set is to supply an initial charge of air for starting the main engine and to deliver power for lighting the car. This set is started by hand.

The control is similar to that of any standard electric trolley car. Mounted on the axles of the forward truck are two GE-205 600-volt box-frame, oil-lubricated commutating-pole railway motors of 100 hp each. By means of a special controller they are placed progressively in series and parallel connection. The voltage is governed by varying the strength of the generator field. Separate handles are provided for throttling the engine and reversing the car.

Gas-Electric Car for Frisco Line

The trucks are of the swing bolster type with elliptic bolster springs and equalizer springs. The headlight consists of a 50-cp Mazda incandescent lamp and reflector, and an air whistle and pneumatic gong are provided. A hot-water heater, coal-fired, is installed for heating the car. To prevent freezing in cold weather when the car is lying idle the heater circulation may be connected to the engine cooling system. A 150-gal. gasoline tank for the power supply is suspended under the car. While the car is running the gasoline is pumped automatically by the engine.

SIGNAL SYSTEM ON THE HUDSON VALLEY RAILWAY

The line of the Hudson Valley Railway at Glens Falls, N. Y., crosses the Hudson River from Main Street by a single-track block. This block is used both ways by two local lines, each three times per hour, and by one interurban every hour. This makes a total of fourteen passenger, freight and express cars, including electric locomotive trains, which pass hourly through the block in the running time of two and one-quarter minutes. All of this varied traffic is protected by the Nachod automatic signal type "C," made by the Nachod Signal Company, Philadelphia. These signals are located at the end of the single-track block and operate through a single line wire by the passage of cars under trolley contactors. The power to actuate the signals is derived from the trolley circuit, and no insulated rail joints or other track changes are required.

One of the two accompanying views shows the signal at the north end of the block neatly mounted on a bracket which is attached by pole bands to a tubular iron pole. The signals are normally neutral, showing neither lights nor disks. When a car runs under the contactor to take the block the opposing signal at the other end of the block is set at stop, a red light and a red disk, and the signal in sight of the motorman changes to permissive, a white light and a white disk, as an evidence of this. An opposing movement

Overhead Switch and Signal, Hudson Valley Railway

to the car in the block is thereby prevented, but following movements are permitted. Should another car enter the block before the first has left warning of the presence of the first car will previously have been given by the permissive signal. When the first car leaves the block the signals will not be changed, but will be held until the second leaves also. Fifteen cars if necessary may thus occupy this block under signal protection. The second car, if desired, might have backed out of the block without passing through it, an operation, for instance, such as might be caused by a line car following a regular car.

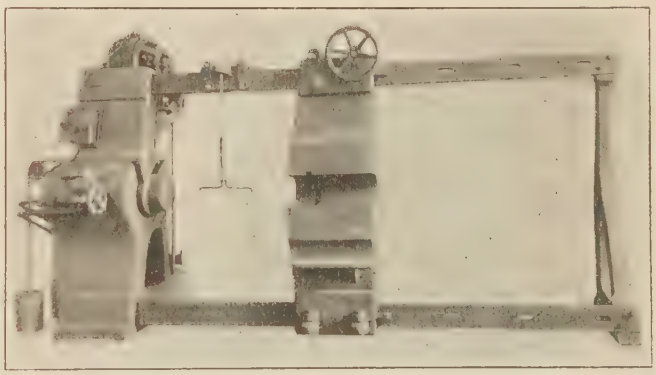
The trolley contactors are hung on the wire at the double-track ends. The flange of the trolley wheel slides against the flexible contact strips, opening them somewhat and diverting a temporary current from them to the relay, thereby causing a change of signal indication. The other view shows them as installed at South Glens Falls. These contactors are without moving parts, operate at high speed and require no maintenance. They are hung at one end only on the span wire, thus being free from any line stress, and are attached to the trolley wire by the usual ears. They are connected by vertical leads from two span wires across the street. They are considerably higher than the trolley wire, so that should the wheel fly off it cannot cut the connections.

The relay in the signal, including both coils and contacts, is immersed in a tank of transformer oil, the high insulation of which tends to prevent lightning troubles, cools the coils, protects the electrical contacts and in general conduces to extremely low maintenance. Access is most conveniently had to the signal relay when necessary by lowering the entire signal box to the ground without disconnecting the leads. By taking out three bolts and drawing up on the block and tackle the hood and relay may be raised for repair or inspection while leaving the oil tank on the ground.

A MOTOR-DRIVEN HYDRAULIC WHEEL PRESS

The Caldwell motor-operated wheel press shown in the accompanying illustration possesses several features which are novel to this indispensable tool of the wheel shop. Thus, for convenience in handling heavy work of irregular shape that cannot be rolled to and from the press, the upper horizontal parallel bar is not directly above the lower, but is placed at a slight angle to permit the use of an overhead crane in handling the material.

The plungers (not shown in the view) are operated by eccentrics on the jack shaft, which is driven by cut gears having a 3½ to 1 ratio, and are said to operate without vibration. The ram is drawn back automatically as soon as the pressure is shut off from the pumps. An extra valve to connect with the city water line is furnished when it is possible to have such connection. By opening this valve before using the pressure from the pump, the steel-faced ram is moved out against the work more rapidly than could



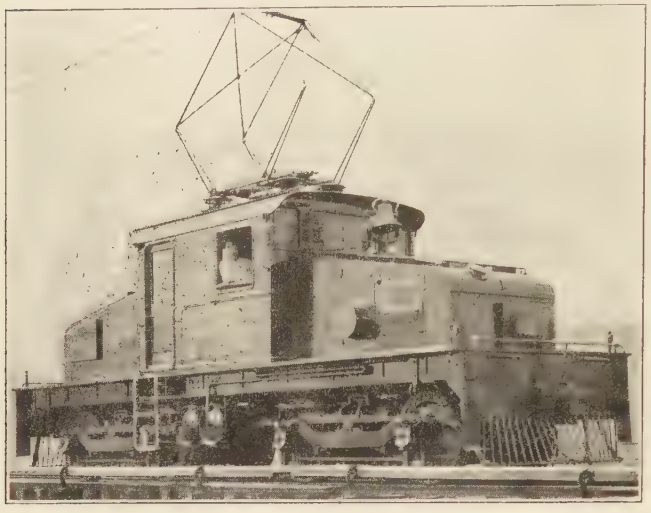
Hydraulic Press for Wheels and Other Work

be done by the pumps; the city water line valve is then closed, the pump valve opened and the plungers started.

The press has low-pressure and high-pressure pumps. The low-pressure pump operates the ram up to a certain pressure with a greater speed than the high-pressure pump and consequently increases the amount of work that can be handled by the use of a high-pressure pump alone. This low-pressure cylinder has a relief valve so that the pump works until about 50 tons pressure is reached, when it automatically cuts out. The pressing operation is then continued at a slower rate with the high-pressure pumps. This automatic device is especially efficient in pressing-off work. The low-pressure pump works until about 50 tons is reached, when the high-pressure pumps succeed it until the work is pressed off far enough to permit its rapid completion with low pressures. All presses have a safety valve to prevent overloading. The plungers are driven by a 7½-hp d. c. Westinghouse motor which is mounted on a bracket near the top of the ram casting and is connected to the plunger shaft by gears.

A 600 VOLT-1200 VOLT D. C FREIGHT LOCOMOTIVE FOR OAKLAND, CAL.

The 47-ton standard-gage electric freight locomotive shown in an accompanying illustration has recently been added to the rolling stock of the Oakland, Antioch & Eastern Railway. This system when completed will make a network of about 156 miles, extending out from Oakland, Cal. As the locomotive control parts and car control parts on this railway are interchangeable, the number of spare parts to be carried in stock is small enough to insure ease in maintenance.



600-Volt-1200-Volt D. C. Locomotive

The mechanical parts were furnished by the Baldwin Locomotive Works, while the electric equipment was furnished and installed by the Westinghouse Electric & Manufacturing Company. The locomotive is of the well-known double-truck type with steeple cab. It is arranged for double-end operation and can traverse curves of 50-ft. radius when hauling a trailing load. The trucks are of the equalized pedestal type, with one-piece forged iron frames and rigid cast-steel transoms. The pedestals and pedestal braces are of forged iron and the pedestal binders of malleable iron. The cast-steel transom gussets have ample bearings on the frame and transom and act as brake lever guides and brakeshoe hanger supports. The brakes are inside-hung and are applied through a radial beam, which is supported on the inner end of the truck frame. The wheels have cast-iron plate centers with steel tires which are shrunk and bolted on.

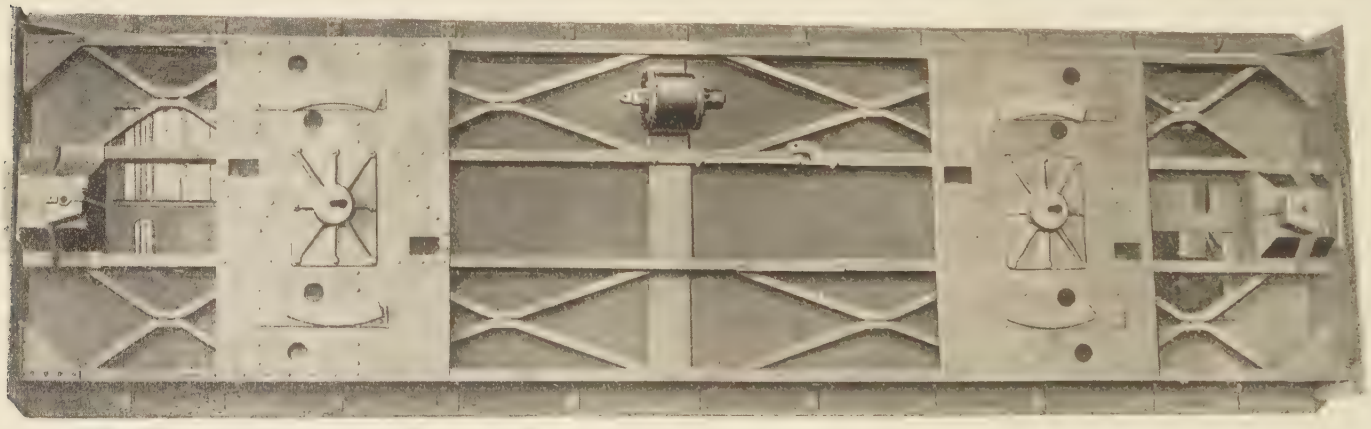
The locomotive frame is principally built-up commercial steel shapes, including four longitudinal sills of 12-in. channels. Diagonal braces, composed of 3-in. channels, are placed between the middle and outer channels on each side. The end bumpers are of steel plate ⅞ in. thick and 29¾ in. deep. The steel draw castings which are riveted in place between the center sills and back of the bumpers take long-shank radial couplers of the M. C. B. type. The bolster plates over the trucks are 66 in. wide and are substantially braced to provide the necessary stiffness. The bolts which secure the center pins to the plates also pass through the flanges of the middle frame sills. All parts of the frame are held together by ⅞-in. rivets.

The cab is of steel and is centrally located. The ends of the locomotive are covered by hoods, under which are placed the switch groups, reversers, resistors, dynamotor-compressor and other equipment. The cab is entered through side doors and has large end windows, so that unobstructed views can be obtained above the hoods. The width of the cab and hoods is less than that of the frame, and there is room for a continuous running board from end to end on each side of the locomotive.

This locomotive has an iron pilot at each end, air sanders with spouts to all the wheels, combined air and hand brakes, two air whistles and two electric headlights. A standard locomotive bell with pneumatic bell ringer is mounted over one of the hoods. The principal dimensions are as follows:

Truck wheelbase	7 ft. 4 in.
Total wheelbase	25 ft.
Distance between truck centers	17 ft. 8 in.
Driving wheels, outside diameter	42 in.
Driving wheels, center diameter	37 in.
Journals, American Electric Railway Association standard	5 in x 9 in.
Width over all	10 ft.
Height to top of cab	12 ft.
Length between coupler knuckles	35 ft.
Total weight	98,100 lb.
Estimated weight of mechanical equipment	57,000 lb.

For propulsion this locomotive is supplied with four slow-speed Westinghouse No. 308-B-6 120-hp, 600-volt-1200-volt commutating-pole railway motors geared 19:54. The driving wheels are 42 in. in diameter. The box type of frame construction is used for the motors, the frame being cast in one piece of steel with large openings at each end for the bearing housings and for taking out the armature endwise. Control of the HL unit switch type is employed. A hand-operated change-over switch is used to change over the main circuit from 600 volts to 1200 volts or vice versa. On 1200 volts the motors are operated four in series and four in series parallel. On 600 volts they are connected for operation with four in series parallel and four in parallel. A dynamotor furnishes low voltage for the lighting and control circuits. The air-brake equipment is of the Westinghouse "EL" type. Air for the brake and control systems is supplied by two D-3-EG dynamotor-driven compressors, each having a delivery capacity of approximately 25 cu. ft. of free air per minute. This locomotive will exert a tractive effort of 16,700 lb. at approximately 10.65 m.p.h. and, with a clean dry rail, a maximum tractive effort of 23,500 lb.



Bottom Framing of High-Tension D. C. Locomotive

News of Electric Railways

Proposed Appraisal of the Metropolitan Street Railway, Kansas City

Bion J. Arnold, Chicago, Ill., and Prof. Mortimer E. Cooley, of the University of Michigan, have been asked by Judge W. C. Hook, of the United States Circuit Court at Kansas City, Mo., to appraise the property of the Metropolitan Street Railway, Kansas City, now in the hands of R. J. Dunham and Ford F. Harvey as receivers, appointed by Judge Hook. The negotiations between the city and the company in regard to a new franchise are *in statu quo*, and the last time the Mayor and the receivers met the receivers announced that they proposed to have the property appraised whether or not negotiations were resumed with the city. The valuation of the whole property, tangible and intangible, was placed at $37,500,000 recently by the receivers in answer to a request from the Mayor. Commenting on the plan of the court to retain Mr. Arnold and Professor Cooley to appraise the property, Frank Hagerman, counsel to the receivers of the company, said:

"There are many interests in the street railway property, all of which have different notions as to values. The court evidently deemed it wise to have experts of the highest standing report the facts with their opinions and the reasons therefor. While their report will not be binding upon anyone, in the light of facts developed, all interests, including the public, can deal intelligently with the situation, and each know whether the others are making unreasonable demands."

Following a recent conference between Mayor Jost of Kansas City and the receivers of the company, the Mayor is reported to have said:

"City Counselor Evans and the city's legal department are busy on a brief in quo warranto proceedings which will be instituted very shortly in the Supreme Court of the State, and our Congressman from this district might be asked to introduce a resolution in Congress to have an investigation made to determine if the Metropolitan Street Railway is not in the federal court to evade its contractual relations with the city. I feel quite positive that the city will be able to show in its brief to the Supreme Court that the company has and is every day violating the provisions of its franchise and that we shall be fully justified in revoking all existing franchises."

Massachusetts Trolley Merger Bill Vetoed

Eugene N. Foss, Governor of Massachusetts, has vetoed the bill to provide for the incorporation of the Worcester, Springfield & Berkshire Street Railway as a consolidation of the electric railway holdings of the New York, New Haven & Hartford Railroad in western Massachusetts with the Worcester and Springfield systems. He also sent to the Legislature a special message in which he expressed the opinion that it was the duty of the State to supply western Massachusetts with electric railway service by a State-owned system, "if private capital is unable to supply this service without surrendering it to the domination of the New York, New Haven & Hartford Railroad." In his veto message the Governor said in part:

"The street railways which were to be consolidated by this act are now the property of voluntary associations. In accordance with a recommendation in my first inaugural address, the tax commissioner was directed to investigate the subject. As a result of his investigation and of a recommendation of the Board of Gas and Electric Light Commissioners, there has been passed by this General Court a resolve which provides for an investigation relative to the holdings of stock in public service corporations by voluntary associations and for the consolidation of companies controlled by them and the liquidation of such associations. A commission is to consider the subject and report to the next General Court.

"There is no question but that the growth of these associations presents grave dangers. The question of their dissolution must be considered with reference to all of them. For one or two of them to attempt to put through such legislation before the whole matter has been considered is another evidence of the disregard for our institutions of the railroad corporation which is interested in these properties. The fact that these interests have insisted on the passage of this legislation, disregarding the recommendation of the Railroad Commissioners, does not bear out the statement that the public service corporations are always ready to follow the recommendations of our boards, even if the boards have no authority to enforce them.

"As to the provisions of the bill itself, an examination of it gives weight to the suspicion that the language of several vital sections is intended to conceal rather than express the true purposes of its projectors. Another question involved in the passage of this act is the expediency of permitting steam railroads to enlarge their ownership of street railways in this Commonwealth. In so far as this question has been the subject of any careful consideration as to the general policy, opinion is against it. An exhaustive examination of the subject was made three years ago by Railroad Commissioners Hall, Bishop and White. Their unanimous report, made to the General Court in January, 1909, is distinctly against it.

"Notwithstanding this the New York, New Haven & Hartford Railroad proceeded to enlarge its field of activity among street railways. Relying on the fact that it had under the laws of a neighboring State a broad charter, clothing it with powers vastly greater than we have considered safe or proper for a railroad, it has undertaken to do in this State acts which were prohibited by our laws. It is in such hands that we are asked to place the control of our only remaining independent system of transportation. No act of mine shall ever aid this result until the managers of this system adopt a policy in their relations with the public and in their observance of our laws which is a distinct improvement over that which they now pursue in this respect.

"I am confident that this act received the approval of the Legislature only because of the reasonable demands of a part of the public in the western section of the Commonwealth for the increased transportation facilities which are promised. I believe the way to get them is to constitute some public board with authority to enforce its orders for such additions and extensions as are in the public interest. It is time to put the seal of the disapproval of this Commonwealth on the continuous proposals of the New York, New Haven & Hartford Railroad to do its duty by this Commonwealth only in exchange for some desired piece of legislation."

The special message of the Governor to the Legislature follows, in part:

"It has been brought to the attention of the present Legislature that an extensive district in the western section of the Commonwealth totally lacks the transportation facilities necessary for its welfare and prosperity. The failure of legislation designed ostensibly to provide such transportation facilities should not prevent action being taken at the present session to secure to the people of this region adequate transportation facilities. Such service should not be secured by methods permitting financial jugglery and the undermining of our public service law. If private capital is unable to supply this service without surrendering it to the domination of the New Haven road, I believe it is the duty of the State to supply that service directly by a state-owned system of electric roads. To this end I recommend that the State conduct, through a special commission, an investigation of the whole problem of more adequate railroad facilities for the western section, particularly the hill towns of the State, the commission to report to the General Court."

On June 11, 1912, Governor Foss' veto of the Western Massachusetts merger bill was overridden in the House by a vote of 157 to 68.

On June 12, 1912, however, the Senate voted not to pass the Western Massachusetts merger bill over the veto of Governor Foss.

Inspection of Tennessee Properties

[illegible] M. Byllesby & Company, Chicago, who are interested in the Tennessee Railway, Light & Power Company, was quoted in the Nashville *Democrat* as follows:

"We are going to commence work shortly on a second power plant on the Ocoee River and make large additions and improvements on our Chattanooga and Nashville property. We will start work immediately on the transmission line of the Great Falls Power Company to Nashville and the line from Great Falls to Chattanooga, and we expect to have the line completed within the next ten months. Temporarily we will bring power from our plant at Ocoee to Nashville to operate the railway and light company's lines. We hope to start work on the second power plant at Great Falls within the next twelve or eighteen months, and expect to send power to Nashville from there and also to Chattanooga. With the combined water-power development of Great Falls and the Ocoee River we shall have available over 125,000 hp. and expect to send enough lighting power from the two plants through Kentucky to Lexington, Louisville and Cincinnati and all the places between the above-mentioned places."

New Schedules Being Prepared in Cleveland

Peter Witt, street railway commissioner of Cleveland, Ohio, and his office force are preparing new schedules for the Cleveland Railway. He is planning to eliminate half the stops on each line and to reduce the running time from 12 to 15 per cent. The new schedules will really be a modification of the time table in use on the Superior Avenue route. J. J. Stanley, president of the Cleveland Railway, favors the elimination of stops. Tests are being made on some lines to learn which stops are used most, how long the cars remain at each stop and other phases of operation. It remains to be seen whether the patrons of the lines will approve the changes. The decision of the board of arbitration in the matter of the Superior Avenue schedule, referred to in the Electric Railway Journal of June 8, 1912, page 987, to the effect that the city has absolute control of the schedules under the Tayler franchise, has afforded Mr. Witt the opportunity to apply his Superior Avenue plan to other lines.

Brief Filed in Detroit Rental Suit

In a brief filed on June 7, 1912, Fred A. Baker, attorney for the Detroit (Mich.) United Railway, contends that the State Railroad Commission has authority to fix rates and determine conditions on streets where franchises have expired. The Common Council has always claimed this right and power. Mr. Baker denies that the city has power to order tracks removed from the streets or to impose any conditions that will interfere with the operation of through traffic. He states, however, that the city has a right to reasonable control over such local matters as the kind of pavement that shall be laid and the service, but not the rental or fare. Mr. Baker contends that the Circuit Court and the State Supreme Court have no jurisdiction in the case of the Fort Wayne line, for the operation of which the city is seeking to collect a rental of $200 a day, claiming the franchise has expired.. He asks that the case be dismissed. Mr. Baker says that all the legal points involved in this case were included in the case started in the United States Court in 1908 to test the Hally ordinance and that subsequent resolutions of the Council to impose rentals merely supplement the main issue. Mr. Baker says:

"It is evident that the fundamental error in the decision of the Circuit Court is that it completely overlooks the public, state-wide character of the system of railways which it is proposed to disrupt by requiring the removal of the tracks from a comparatively small portion of the public highway used by the company. The opinion proceeds upon the hypothesis that all there is involved is the question of whether the date fixed by the city grant had lapsed, and that thereupon, regardless of all other rights and considerations, the municipality could require the railroad company to vacate the streets, unless it submit to confiscatory and unlawful terms as a condition for the continued use of the highway.

"The decision of the learned court overlooked the fact that these railways constitute great public highways, in the continued maintenance and operation of which the public at large has a paramount interest, and that so far as the State at large is concerned it has consented, by the granting of the franchise to the company, to the uninterrupted operation of the lines. It is a mistake to assume that this is a contest which involves solely the rights of localities and private interests. Something of greater importance and of more far-reaching consequence is involved.

"It must not be assumed that in taking the position that its right to occupy the street has not expired the company claims the right is vested in it to continue the maintenance and operation of these railways without due regulation and such reasonable burdens as may be imposed thereon, or that it can stand in the way of the legitimate exercise of the power of the State in this regard. Its position, as we view it, stated plainly, is that these railways are great public highways, serving a public, State purpose; that they are and were intended to be permanent in their character, and that either the present company or some other company, or the State or the municipality or some other public body, is bound to continue to maintain and operate them in the public service.

"We do not claim that by reason of these conditions a right is vested in the grantee in perpetuity to maintain a railroad in the street, free from public control and regulation. What we do contend is that the property of a railroad is of a permanent character necessary and proper for the public service, devoted to the public use, not locally alone, but by a larger and greater interest than that represented by any one municipality, and forming a part of a greater system created by sanction of law, which, we suggest, was intended to be permanently devoted to the public use as a railroad, whether owned by the original company or its successors, or by the public, or by some other body or person of authority, subject to proper and legitimate regulation."

Peter Witt, street railway commissioner of Cleveland, has testified before Leland B. Case, commissioner in the United States District Court, in the so-called Hally ordinance case against the Detroit United Railway. This ordinance was enacted in 1905, but the bondholders of the company secured an injunction which was served upon the city before the ordinance was advertised. The company claims that 3 cents, the rate of fare fixed by the Council on the routes where franchises have expired, is unreasonable. Mr. Witt was summoned as a witness for the city. He testified that the Cleveland Railway, operating at a fare of 3 cents, pays dividends of 6 per cent on its stock and takes care of its own pavement. He said that the city has the right to regulate service and route the cars. Mr. Witt denied that there is a deficit of $284,000 in the funds of the Cleveland Railway, but said that even if there was such a deficit a charge of 1 cent for each transfer would create a fund which would amount to twice the alleged deficit.

On the evening of June 5, 1912, the Common Council adopted a resolution which provides for the submission of the question of charter revision to a vote of the people at the municipal election on Nov. 5, 1912. This revision will in all probability contain provisions affecting street railway operation.

Twelve manufacturing concerns in Fairview, which employ about 10,000 men, have asked the Council for a franchise to permit the Detroit United Railroad to extend its line up Kercheval Avenue from the present terminal at Hurlbut Avenue to the city limits, in order to afford better service, for the employees. They have also asked the company to improve the service on Jefferson Avenue.

Report Against Elevated Railway for Los Angeles.—The Board of Public Utilities of Los Angeles, Cal., has decided to recommend to the Council that it refuse the application of Anson W. Delane, 404 Higgins Building, Los Angeles, for a franchise to construct a system of elevated railways in the city. The board believes the plan impracticable with reference to establishing stations in the streets, etc.

Electric Railway Recommended for Schenley Park.—John M. Goehring, W. G. Wilkins and Enoch Rauh, of the Council of Pittsburgh, Pa., sitting as a special committee, have recommended that the city build an electric railway through Schenley Park to reach inaccessible portions of the playground. The committee favors the construction of the line along the sides of the present roadways. The trolley wire is to be strung from ornamental poles. The line will be about 3½ miles long. The Bureau of Surveys has been instructed to survey the route for the road. It is proposed to have the Pittsburgh Railways operate the road in the park and issue transfers to its lines which pass the park.

Injunction Granted Against Bond Hill Extension at Cincinnati.—Judge Spiegel of the Superior Court at Cincinnati handed down a decision on June 6, 1912, in which he holds that the action taken by the City Council in changing the name of a part of Paddock Road to Reading Road and a part of Reading Road to Reading Boulevard is illegal and that the consents of property owners are insufficient, thus rendering invalid the franchise given to the Cincinnati Traction Company to build on Reading Road to the neighborhood of Bond Hill. It seems that most of the property owners on Paddock Road consented to the change, but that only a few residents of Reading Road did so. Council then changed the names as indicated. This made the number of consents on Reading Road sufficient.

Extent of Street Railway Trackage in New York State.—According to the Street Railway Association of the State of New York, for every thousand inhabitants added to the population of New York State during the last decade a mile of new street railway was built and equipped at a cost of about $75 per capita. It is calculated that the trackage within the boundaries of New York at present at the disposal of street car riders would reach from New York to San Francisco and back again as far as Denver. Where sixty-six scattered lines, each extending less than 10 miles, made up four-fifths of the State's street railways twenty years ago, twelve systems now cover 3000 miles. Over the 4700 miles of electric railway that have been extended through the State an average ride of more than 40 miles is offered by all the companies, while sixteen years ago the average trip was only 16 miles.

Construction of Greenville, Spartanburg & Anderson Railway Progressing Satisfactorily.—Very satisfactory progress is being made in constructing the Greenville, Spartanburg & Anderson (S. C.) Railway, which is being equipped for operation on 1500 volts. The line has been graded between Greenwood and Belton, a distance of 30 miles, and the track has been laid for about 18 miles. From Belton and Anderson to Greenville the work, while satisfactory, has not been pushed so much as that between Greenwood and Belton. This portion will be finished, it is claimed, by the fall. It is proposed to operate cars between the two cities not later than October. Little construction work has been done north of Greenville on account of the route not being selected south of Spartanburg. The depots at Donalds, Hodges, Honea Path, Downs and Belton are all nearing completion and are now about ready to have the roofs put in place.

Decisions Reversing the Commerce Court.—On June 7, 1912, the Supreme Court of the United States rendered opinions reversing the Commerce Court in four important cases involving the power of the Interstate Commerce Commission to administer the interstate commerce acts and regulate railroad rates and practices. The Interstate Commerce Commission contended that the Commerce Court has only the same jurisdiction over the commission that the federal circuit courts possessed before the creation of the Commerce Court. It also contended that the Supreme Court prior to the creation of the Commerce Court had accurately defined the jurisdiction of the federal courts with respect to the interstate commerce cases. The Supreme Court's rulings restrict the Commerce Court's jurisdiction to the affirmative orders of the commission, and bar the Commerce Court from inquiring into the facts upon which the commission's acts were based, or trying the cases over again in the Commerce Court on their merits. The principal decisions were announced by Chief Justice White and concurred in by the entire court. The specific point ruled upon was that parties who failed to get relief before the Interstate Commerce Commission have no right to go into the Commerce Court and have that court pass upon the facts to ascertain if relief should have been granted them. On June 11, 1912, the Senate refused to continue the Commerce Court in the judicial appropriation bill, from which the House had already stricken it. This bill carries with it the regular annual appropriations for the legislative, executive and judicial branches of the government. Under the Constitution the five judges of the court are not removable except by impeachment. The question was debated in the Senate of the proper method of providing them with ranking positions elsewhere.

PROGRAMS OF ASSOCIATION MEETINGS

Keystone Railway Club

The next meeting of the Keystone Railway Club will be held at Harrisburg, Pa., on June 25, 1912. The program will include three papers by prominent railroad men.

Roadmasters' and Maintenance of Way Association

The following is the program of subjects that will be discussed at the convention of the Roadmasters' and Maintenance of Way Association at Buffalo, N. Y., Sept. 10-13, 1912:

"Foreign Labor."

"Stone Ballast from the Crusher Into the Track."

"New and Improved Appliances."

"Construction Work."

"How to Secure Foremen—Organization of Section—Length of Section."

"Deterioration of Spikes and Angle Bars in Preserved Ties."

Street Railway Association of the State of New York

The following program has been announced for the thirtieth annual meeting of the Street Railway Association of the State of New York, which is to be held at the United States Hotel, Saratoga, N. Y., on June 26 and 27, 1912:

JUNE 26—FORENOON SESSION

Roll call, reports of committees, etc.

JUNE 26—AFTERNOON SESSION

Paper, "Extension of Direct Current Railways by the Application of Higher Voltages," by W. P. White, engineer of the railway and traction department of the General Electric Company, Schenectady, N. Y.

Paper, "Recent Developments of Railway Apparatus," by K. A. Simmon, of the railway engineering department of the Westinghouse Electric & Manufacturing Company, New York, N. Y.

Paper, "Advantages To Be Gained by Membership in the Street Railway Association of the State of New York," by W. J. Harvie, of J. G. White & Company, Inc., New York, N. Y.

JUNE 27—MORNING SESSION

Papers, "Prevention of Accidents," by W. B. Baker, claim agent of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.; James McPhillips, attorney of the Hudson Valley Railway, Glens Falls, N. Y.; J. F. Hamilton, general manager of the Schenectady Railway, Schenectady, N. Y., who will consider the subject from the legal standpoint, the claim agent's standpoint and the operating standpoint, respectively.

The speakers at the banquet will include Frederick W. Stevens, chairman of the Public Service Commission of the Second District of New York; Frederick W. Whitridge, president of the Third Avenue Railway, New York, N. Y., and Thomas N. McCarter, president of the American Electric Railway Association and president of the Public Service Railway, Newark, N. J.

It was first thought best to hold the banquet on the night before the convention assembled, but it has since been decided to hold the banquet on the evening of June 26, the first day of the convention.

Financial and Corporate

Stock and Money Markets

June 12, 1912.

There was very little interest to-day in the securities traded in on the New York Stock Exchange. The total trading for the day amounted to only 163,250 shares and the price changes were insignificant. On the whole, prices were firm. The interest in financial circles centered in the investigation of the Pujo committee. The decision of the Supreme Court reversing the Commerce Court in four important cases involving the powers of the Interstate Commerce Court was also the subject of discussion. Rates in the money market to-day were: Call, 2½ @ 3 per cent; sixty days, 3 per cent; ninety days, 3¼ per cent.

In the Philadelphia market trading was at low ebb and price changes were few and unimportant.

In the Chicago market there were a number of advances in prices. Chicago Railways 2's made a substantial gain and Chicago Railway 5's were also higher.

In Boston the zinc stocks, particularly Butte and Superior, completely dominated the transactions.

In Baltimore trading was dull and featureless. Small transactions were reported in Norfolk & Portsmouth Traction 5's, Norfolk Railway & Light 5's, United Railway 4's and United Railways refunding 5's.

Quotations of traction and manufacturing securities as compared with last week follow:

	June 4.	June 12.
American Brake Shoe & Foundry (common)	a96	a96¼
American Brake Shoe & Foundry (preferred)	137	137½
American Cities Company (common)	...	...
American Cities Company (preferred)	...	...
American Light & Traction Company (common)	a308	350
American Light & Traction Company (preferred)	a110	110
American Railways Company	a43¾	a43½
Aurora, Elgin & Chicago Railroad (common)	a45	a48
Aurora, Elgin & Chicago Railroad (preferred)	a88	a88
Boston Elevated Railway	a128	a129
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	78	78
Boston & Worcester Electric Companies (common)	a10½	a9⅞
Boston & Worcester Electric Companies (preferred)	a54	a54
Brooklyn Rapid Transit Company	88⅜	88⅜
Capital Traction Company, Washington	126¾	a128
Chicago City Railway	a190	a190
Chicago Elevated Railway (common)	a36	a35
Chicago Elevated Railway (preferred)	a92	a92
Chicago Railways, ptcptg., ctf. 1	a96	a92
Chicago Railways, ptcptg., ctf. 2	a30	a26
Chicago Railways, ptcptg., ctf. 3	a9½	a8½
Chicago Railways, ptcptg., ctf. 4	a5	a4
Cincinnati Street Railway	a130	a129½
Cleveland Railway	a106	a105½
Cleveland, Southwestern & Columbus Ry. (common)	*5	a7
Cleveland, Southwestern & Columbus Ry. (preferred)	*32	a40
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	80	80
Columbus Railway (preferred)	a95	a95
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	*135	*135
Detroit United Railway	a72	a72
General Electric Company	a170½	169
Georgia Railway & Electric Company (common)	a124¾	a125
Georgia Railway & Electric Company (preferred)	a86	a86
Interborough Metropolitan Company (common)	20	20
Interborough Metropolitan Company (preferred)	57⅞	57½
International Traction Co., 4% bond, rcts	*75	*75
Indiana Union Traction Company	*7	a7
Kansas City Railway & Light Company (common)	a21	a21
Kansas City Railway & Light Company (preferred)	a48	a48½
Lake Shore Electric Railway (common)	*7	a7¼
Lake Shore Electric Railroad (1st preferred)	*91½	a91
Lake Shore Electric Railway (2d preferred)	*27	25
Manhattan Railway	137	135⅝
Massachusetts Electric Companies (common)	a20½	20
Massachusetts Electric Companies (preferred)	92	a93
Milwaukee Electric Railway & Light (preferred)	*104½	a105
Norfolk Railway & Light Co	*27	a29
North American Company	83½	83⅝
Northern Ohio Light & Traction Company (common)	a70	a70
Northern Ohio Light & Traction Company (preferred)	a105	a105
Philadelphia Company, Pittsburgh (preferred)	a51½	a51⅝
Philadelphia Company, Pittsburgh (common)	43¾	a43¾
Philadelphia Rapid Transit Company	a23	a22⅞
Portland Railway, Light & Power Company	*68½	69
Public Service Corporation	a111	a112
Third Avenue Railway, New York	a39	a39
Toledo Railways & Light Company	5½	a7¼
Twin City Rapid Transit Co., Minneapolis (common)	a107½	a105½
United Rys. & Electric Company (Baltimore)	a24¼	*24¼
United Rys. Inv. Co. (common)	30	30¾
United Rys. Inv. Co. (preferred)	60	59¼
Virginia Railway & Power Company (common)	a50	a50½
Virginia Railway & Power Company (preferred)	89	a90
Washington Ry. & Electric Company (common)	a89½	a92
Washington Ry. & Electric Company (preferred)	a95	a94⅞
West End Street Railway, Boston (common)	a85	a85
West End Street Railway, Boston (preferred)	a101	a101
Westinghouse Elec. & Mfg. Co.	a74	a72½
Westinghouse Elec. & Mfg. Co. (1st preferred)	a120	a120

*Last sale. a Asked.

Incorporation of the Texas Power & Light Company

The Texas Power & Light Company has been incorporated under the laws of Texas to acquire and operate electric light and power and gas properties in Texas. It will take over all the properties, rights and franchises of the Waco Electric & Gas Company, the Cleburne Electric & Gas Company, the Hillsboro Electric & Gas Company, the Waxahachie Electric & Gas Company, the Temple Electric Light Company, the Sherman Electric & Gas Company and the Bonham Electric & Gas Company. The purchase of these properties is being financed by the Electric Bond & Share Company, New York, N. Y., presumably in the interest of the American Power & Light Company, which already controls the Kansas Gas & Electric Company, the Pacific Power & Light Company and the Portland Gas & Coke Company. The Texas Power & Light Company has an authorized capital stock of $13,000,000, of which $10,000,000 is common stock and $3,000,000 is 7 per cent cumulative preferred stock, redeemable at 115.

The Texas Power & Light Company has a contract with the Southern Traction Company which runs for fifty years to supply all the power for its Waco electric railway system and for its interurban lines, which are to be built from Waco to Dallas and from Dallas to Corsicana. Work on these lines is in progress and a part of the road will probably be ready for operation by Sept. 1, 1912. The system now planned will cover about 135 miles of interurban lines in addition to the present Waco city system of approximately 16 miles of track. The power for the operation of these lines will be generated at a steam station to be built at Waco. The contract with the Southern Traction Company gives the company a perpetual right-of-way easement, ahead of all mortgages of the Southern Traction Company, to erect and maintain poles and wires along the right-of-way of the interurban railway. The lines of the interurban railway will reach Hillsboro and Waxahachie, and the electric properties of the companies at those points will be operated by power from the Waco plant.

Sale of Wheeling (W. Va.) Traction Company.

The stock of the Wheeling (W. Va.) Traction Company is being deposited with the Dollar Savings & Trust Company, Wheeling, W. Va., subject to sale at $120 per share to G. O. Nagle, general manager of the company, acting for others. One-quarter of the purchase price is to be paid on or before Aug. 1, 1912, and the remainder is to be paid at stated periods. Mr. Nagle is reported to have said:

"I am not at liberty at present to announce the names of the gentlemen I represent. I can only say that they are men of abundant means and have made the purchase as an investment. All improvements that have been planned will be carried out and undoubtedly others will be made in the future. On the whole I can assure the people of Wheeling that the property will not only be kept on a high plane of efficiency, but will continue to render satisfactory service to all points on the system. Personally I expect to stay with the new company, give it my best effort and assure the public that the transaction is for their benefit. The deal will bring into the community a large amount of capital, which can only serve to make Wheeling and her citizens more prosperous."

Berlin & Northern Railway, Berlin, Ont.—The Ontario Legislature has approved the proposed change in the name of the Berlin & Bridgeport Electric Street Railway to the Berlin & Northern Railway.

Chicago (Ill.) City Railway.—Arguments in a suit attacking the merger of the Chicago City Railway and connecting railways are being heard in the Superior Court. This merger included the Chicago City Railway and four other companies which operate in the southern and southwestern portions of Chicago. The suit has been brought by a stockholder of the Chicago City Railway, who asks to have the holding company dissolved.

Columbus, Delaware & Marion Railway, Marion, Ohio.—The item under the name "Columbus, Delaware & Marion Railway, Marion, Ohio," published in this department of the

ELECTRIC RAILWAY JOURNAL for June 8, 1912, purporting to refer to the finances of that company, was in error. The railroad in question is the Columbus, Marion & Bucyrus Railroad. This company has nothing in common with the Columbus, Delaware & Marion Railway.

Evansville (Ind.) Electric Railway.—E. R. Barnard, Philadelphia, Pa., is offering for subscription at a price to yield 5⅞ per cent first mortgage 4 per cent gold bonds of the Evansville Electric Railway dated May, 1901, and due May, 1921. The total authorized and outstanding issue is $1,200,000 and the Farmers' Loan & Trust Company, New York, N. Y., is trustee of the mortgage placed to secure the bonds.

Galveston-Houston Electric Company, Galveston, Tex.—Stone & Webster, Boston, Mass., are offering for subscription, at a price to yield 6.25 per cent, $350,000 of 6 per cent cumulative preferred stock of the Galveston-Houston Electric Company. The company has outstanding $2,300,000 of preferred stock and $3,000,000 of common stock. It guarantees interest on $6,232,000 of outstanding bonds of the Galveston Electric Company, Houston Electric Company and the Galveston-Houston Electric Railway, and there is outstanding $600,000 of coupon notes due on April 1, 1914. It owns substantially all of the preferred and common stocks of the Galveston Electric Company and the Houston Electric Company and the entire capital stock of the Galveston-Houston Electric Railway.

Indianapolis, New Castle & Eastern Traction Company, Indianapolis, Ind.—The Indianapolis, New Castle & Eastern Traction Company has been incorporated in Indiana with an authorized capital stock of $1,000,000 to succeed the Indianapolis, New Castle & Toledo Railway, the property of which was sold under foreclosure recently. This is in effect a change of name from the Indianapolis, New Castle & Northeastern Traction Company, to which reference was made in the ELECTRIC RAILWAY JOURNAL of May 25, 1912, page 892. The incorporators of the Indianapolis, New Castle & Eastern Traction Company are John P. Todd, Frank Thompson, Frederick A. Likely, William Winter and B. Q. Hendricks.

Interborough Rapid Transit Company, New York, N. Y.—The Court of Appeals has sustained the right of the Continental Securities Company and Clarence H. Venner, as stockholders of the Interborough Rapid Transit Company, to begin an action against August Belmont, Andrew Freedman and others, as directors and stockholders of the Interborough Company to set aside a transfer made to Belmont & Company of 15,000 shares of stock of that company, estimated to be worth $4,500,000.

Lake Shore Electric Railway, Cleveland, Ohio.—The Public Service Commission of Ohio has refused to grant the Lake Shore Electric Railway authority to issue $56,000 of bonds at 80 instead of par, to raise funds to improve its rolling stock and track.

Memphis (Tenn.) Street Railway.—The Memphis Street Railway has declared an initial dividend of 1 per cent on its common stock, payable on June 29, 1912, to holders of record June 20. The regular quarterly dividend of 1¼ per cent on the preferred stock also has been declared, payable June 29 to holders of record June 20.

Moncton Tramways, Electricity & Gas Company, Moncton, N. B.—T. N. Barnsdall, Pittsburgh, Pa., and his associates are reported to have acquired a majority of the stock of the Moncton Tramways, Electricity & Gas Company. New officers and directors have been elected as follows: R. Law, Jr., president; E. B. Reeser, vice-president and general manager; H. N. Price, superintendent of tramways and electricity; A. B. Farmer, superintendent of the natural gas department; D. Henderson, F. W. Summer, O. P. Boggs, H. C. Stuart, O. E. Bartlett, directors.

Monongahela Valley Traction Company, Fairmont, W. Va.—N. W. Halsey & Company, New York, N. Y.; Middendorf, Williams & Company, Baltimore, Md., and Nelson, Cook & Company, Baltimore, Md., are offering for subscription at 96 and interest $2,500,000 of first and refunding 5 per cent gold bonds of the Monongahela Valley Traction Company dated June 1, 1912, and due June 1, 1942. They are of the denominations of $500 and $1,000 and are redeemable at 105 and interest on any interest date after June, 1922. The Fidelity Trust Company, Baltimore, Md., is trustee of the mortgage which secured the bonds. As previously stated in the ELECTRIC RAILWAY JOURNAL, the Monongahela Valley Traction Company is a consolidation of the Fairmont & Clarksburg Traction Company, Fairmont & Northern Traction Company and the Clarksburg & Weston Electric Railway. The total amount of capital stock authorized and outstanding is $7,500,000. Of this amount $5,000,000 is common stock and $2,500,000 is 5 per cent cumulative preferred stock. The total amount of first and refunding 5 per cent bonds authorized is $15,000,000. Of this amount the present offering of $2,500,000 is all that is outstanding. There is reserved to retire Fairmont & Clarksburg Traction Company first mortgage 5 per cent bonds of 1938 $2,500,000 and $10,000,000 is reserved for additions and extensions.

New Orleans Railway & Light Company, New Orleans, La.—An initial dividend of 1 per cent has been declared on the $20,000,000 of common stock of the New Orleans Railway & Light Company, payable on July 1, 1912, to holders of record on June 14.

New York State Railways, Rochester, N. Y.—The meeting of the stockholders of the New York State Railways, which was originally called for May 14, 1912, to authorize the new mortgage for $50,000,000, has been further postponed to June 15, 1912.

Ohio Traction Company, Cincinnati, Ohio.—Permission has been granted to the Ohio Traction Company by the Public Service Commission of Ohio to issue $750,000 of bonds to provide funds to increase the capacity of its East End power house.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—A special meeting of the stockholders of the Puget Sound Traction, Light & Power Company has been called for June 27, 1912, to authorize the directors to reincorporate the company under the laws of Massachusetts. The company was incorporated under the laws of Maine on Jan. 2, 1912, and at that time provision was made for its reincorporation under the laws of some other state if found advisable.

Sedalia Light & Traction Company, Sedalia, Mo.—The property of the Sedalia Light & Traction Company was sold under foreclosure at Sedalia on June 7, 1912, to representatives of the bondholders' committee, which is composed of Otto G. Bannard, Robert T. Sheldon and Herbert K. Hallett. As stated in the ELECTRIC RAILWAY JOURNAL of April 20, 1912, page 673, the property will be turned over to H. L. Doherty & Company, New York, N. Y., for operation as soon as the floating liabilities have been liquidated and the receivers have been discharged. It is planned to incorporate a new company under the laws of Missouri with an authorized capital stock of $2,500,000, of which $500,000 will be preferred stock. A total of $2,500,000 of 5 per cent first-mortgage bonds will be authorized. Of these bonds only $400,000 will be issued at this time. Holders of the $749,000 of old bonds of the company will receive 50 per cent of their holdings in new bonds and 50 per cent in new preferred stock. Dividends on the preferred stock will be guaranteed by the Gas Securities Company, New York, N. Y., at the rate of 1 per cent the first year, 2 per cent the second year, 3 per cent the third year, 4 per cent the fourth year and 5 per cent the fifth year and thereafter. After seven years the preferred stock will be convertible into bonds of the company under provisions included in the agreement. The $2,000,000 of common stock is to be held in trust for Doherty & Company and will become their property when the net earnings of the company are equal to one and three-quarters times the interest on the bonds and the dividends on the preferred stock for twelve months. If within seven years this proportion of the net earnings is not reached, the trustee is to deliver the common stock to the committee which represents the bondholders.

Susquehanna Railway, Light & Power Company, New York, N. Y.—At a special meeting of the stockholders of the Susquehanna Railway, Light & Power Company at Hartford, Conn., on June 7, 1912, the plan to merge the company with the United Gas & Electric Corporation was ratified. The organization of the United Gas & Electric Corporation to control the Susquehanna Railway, Light & Power

Company, the International Traction Company and other companies was referred to at considerable length in the Electric Railway Journal of May 25, 1912, page 891, and June 8, 1912, page 973.

Toledo Railways & Light Company, Toledo, Ohio.—At a meeting of a committee of the bondholders of the Toledo Railways & Light Company, on June 6, 1912, provision was made for the appointment of a sub-committee of three to meet a similar sub-committee of the committee representing the stockholders to discuss plans to reorganize the company. These sub-committees are to report back to a joint meeting of committees of bondholders and stockholders to be held on or before June 26. If the sub-committees fail to agree upon a reorganization plan satisfactory to both committees, then the bondholders will proceed to reorganize the company on a plan of their own. The bondholders' committee has provided for the payment of interest due July 1 on bonds of underlying companies, approved the Monroe Street improvement and recommended that the present fare of practically 3 cents be kept in effect until about August 1, or for a period of six months.

United Railways, St. Louis, Mo.—On June 1, 1912, the Supreme Court of Missouri at Jefferson City decided that the suit which was brought against the United Railways by J. Brooks Johnson to compel an accounting in regard to the properties of the St. Louis Transit Company was barred by the statute of limitation. A suit attacking the validity of the agreement between the city of St. Louis, the United Railways and Brown Brothers & Company, New York, N. Y., in which Mr. Johnson asked for the appointment of a receiver for the St. Louis Transit Company, was decided against Mr. Johnson several months ago.

Union Traction Company of Indiana, Anderson, Ind.—The Union Traction Company of Indiana has elected directors as follows: Randal Morgan and J. Levering Jones, Philadelphia, Pa.; W. Kesley Schoepf, Cincinnati, Ohio; John T. Frenzel and Harold B. Hibben, Indianapolis, Ind.; Philip Matter, Marion, Ind.; Frank C. Ball, Muncie, Ind.; R. K. Willman, Hartford City, Ind.; Arthur W. Brady, Anderson, Ind. Mr. Frenzel, Mr. Ball and Mr. Willman have previously had no official connection with the Union Traction Company of Indiana or its predecessor companies.

Virginia Railway & Power Company, Richmond, Va.—The Richmond, Urbanna & Peninsula Railway and the Virginia Railway & Power Company have filed with the city clerk their acceptance of the terms of the ordinance recently adopted by the Council authorizing the transfer of the Seven Pines line from the system of the Virginia Railway & Power Company to the Richmond, Urbanna & Peninsula Railway.

Washington Railway & Electric Company, Washington, D. C.—A special meeting of the stockholders of the Washington Railway & Electric Company has been called for Aug. 15, 1912, to vote to merge with the company the Anacostia & Potomac River Railroad, the Brightwood Railway and the Washington, Woodside & Forest Glen Railway & Power Company. The Washington Railway & Electric Company owns $1,993,250 of the $2,000,000 of capital stock of the Anacostia & Potomac River Railroad, $108,250 of the $108,500 of capital stock of the Brightwood Railway and all of the $25,000 of capital stock of the Washington, Woodside & Forest Glen Railway & Power Company.

Wisconsin Public Service Company, Green Bay, Wis.—N. W. Halsey & Company, New York, N. Y., and Chicago, Ill., offer at 95 and interest $1,150,000 of 5 per cent first and refunding mortgage gold bonds of the Wisconsin Public Service Company. These bonds are dated Jan. 1, 1912, and are due July 1, 1942. The Wisconsin Trust Company, Milwaukee, Wis., is trustee of the mortgage securing the bonds. The company was formerly named the Green Bay Traction Company and owns all of the property which formerly belonged to the Northern Hydroelectric Power Company and all of the capital stock and bonds of the Green Bay Gas & Electric Company. The capital stock of the company is $1,600,000, of which $1,000,000 is common stock and $600,000 is 6 per cent preferred stock. All of this stock is outstanding. The total amount of bonds authorized is $15,000,000, of which $2,250,000 has been issued.

Dividends Declared

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Commonweath Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred.

Continental Passenger Railway, Philadelphia, Pa., $3.

Indianapolis (Ind.) Street Railway, 3 per cent.

Lake Shore Electric Railway, Cleveland, Ohio, quarterly, 1½ per cent, first preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred; 1 per cent, common.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1½ per cent, common.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., quarterly, 1¼ per cent, preferred.

Syracuse (N. Y.) Rapid Transit Company, quarterly, 1½ per cent, preferred; quarterly 1 per cent, common.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Union Railway, Gas & Electric Company, Rockford, Ill., quarterly, 1½ per cent, preferred.

Union Traction Company, Philadelphia, Pa., $1.50.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

Utica & Mohawk Valley Railway, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

West End Street Railway, Boston, Mass., quarterly, $2, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY

Period			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1 m.,	Apr.,	'12	$26,078	$21,886	$4,191	.....	.....
1 "	"	'11	21,736	18,593	3,144	.....	.....

BANGOR RAILWAY & ELECTRIC COMPANY

1 m.,	Apr.,	'12	$51,492	*$24,655	$26,837	$16,492	$10,345
1 "	"	'11	43,097	*20,633	22,464	12,479	9,985
10 "	"	'12	540,242	*242,820	297,422	148,410	149,012
10 "	"	'11	483,650	*224,081	259,569	121,563	138,006

CHATTANOOGA RAILWAY & LIGHT COMPANY

1 m.,	Apr.,	'12	$81,208	*$47,236	$33,972	$21,508	$12,464
1 "	"	'11	75,114	*43,042	32,072	19,437	12,635
4 "	"	'12	320,201	*190,264	129,937	85,550	44,387
4 "	"	'11	290,307	*167,844	122,463	77,261	45,202

CLEVELAND, PAINESVILLE & EASTERN RAILROAD

1 m.,	Apr.,	'12	$26,527	$16,307	$10,220	$9,808	$413
1 "	"	'11	26,573	14,672	11,901	8,172	3,729
4 "	"	'12	95,881	62,311	33,569	39,525	5,956
4 "	"	'11	94,814	55,125	39,690	32,692	6,998

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY

1 m.,	Apr.,	'12	$91,091	$54,288	$36,803	$30,498	$6,305
1 "	"	'11	86,528	49,375	37,154	30,091	7,063
4 "	"	'12	335,034	213,099	121,934	120,966	969
4 "	"	'11	326,911	193,654	133,258	120,149	13,108

DETROIT UNITED RAILWAY

1 m.,	Apr.,	'12	$931,821	$590,044	$341,776	$177,051	$104,724
1 "	"	'11	815,049	518,595	296,453	176,379	120,073
4 "	"	'12	3,452,918	2,226,440	1,223,477	714,216	509,260
4 "	"	'11	3,040,641	1,922,028	1,118,612	703,950	414,661

LAKE SHORE ELECTRIC RAILWAY

1 m.,	Apr.,	'12	$97,806	$59,889	$37,918	$34,854	†$3,064
1 "	"	'11	91,958	53,207	38,751	34,614	†4,137
4 "	"	'12	359,197	230,684	128,513	139,047	†10,535
4 "	"	'11	339,314	200,518	138,797	138,814	†17

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY

1 m.,	Apr.,	'12	$46,767	*$29,515	$17,252	$14,446	$2,806
1 "	"	'11	38,736	*25,150	13,586	13,340	246
4 "	"	'12	502,038	*319,432	182,606	144,486	38,120
4 "	"	'11	435,013	*276,699	158,314	131,665	26,649

NORTHERN OHIO TRACTION & LIGHT COMPANY

1 m.,	Apr.,	'12	$221,784	$128,168	$93,616	$43,821	$49,795
1 "	"	'11	200,015	114,762	85,253	44,329	40,924
4 "	"	'12	845,271	495,537	349,733	175,287	174,446
4 "	"	'11	748,886	437,384	311,502	177,445	134,056

PORTLAND RAILWAY, LIGHT & POWER COMPANY

1 m.,	Apr.,	'12	$532,558	*$277,696	$254,862	$167,108	$87,754
1 "	"	'11	526,475	*246,045	280,430	121,231	159,199
4 "	"	'12	2,125,836	*1,104,745	1,021,091	573,744	447,347
4 "	"	'11	2,032,114	*998,015	1,034,099	491,506	542,593

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY.

1 m.,	Apr.,	'12	$90,423	*$53,248	$37,175	$19,541	$17,634
1 "	"	'11	84,700	*54,159	30,541	19,693	10,848
4 "	"	'12	378,984	*213,274	165,710	78,586	87,124
4 "	"	'11	346,542	*208,544	137,998	77,642	60,356

UNION RAILWAY, GAS & ELECTRIC COMPANY.

1 m.,	Apr.,	'12	$279,735	*$171,187	$108,548	$69,147	$39,401
1 "	"	'11	242,968	*145,742	97,226	60,686	36,540
4 "	"	'12	1,202,810	*722,363	480,447	271,538	208,909
4 "	"	'11	1,024,475	*604,183	420,292	239,286	181,006

*Includes taxes.

Traffic and Transportation

Report of Quebec Commission on Fender and Wheelguard Tests

The report of the Quebec Public Utilities Commission in regard to the car fender and wheelguard tests which were conducted under its direction in Montreal on Nov. 7 and 8, 1911, follows in part:

"The commission, having received a number of requests from inventors and others to examine into the merits of and approve various fenders and life-saving devices to be used upon street cars, referred all such applications to Percival W. St. George, consulting engineer.

"Mr. St. George's report covered the following designs of fender or wheelguard, generally named after the inventor, viz.: Conway fender, Moorhouse fender, Rose fender, Maxham combination front fender and Bray, Masson & Fortier fender, all of which were approved for test. Arrangements were made with the Montreal Street Railway to use suitable trackage and cars. The company also supplied the dummies required and strove to facilitate the tests. The following devices were tested: G. O. S. Conway, Moorhouse and Rose fenders. The remaining apparatus reported to Mr. St. George for test were not forthcoming at the trial.

"The dummies used represented as nearly as possible, in size and weight, a child of 50 lb., a woman of 120 lb. and a man of 170 lb. The postures used with each were: upright face or back on, upright side on, lying across rails, lying head on diagonally, lying feet on diagonally, lying head between rails, lying feet between rails, lying head and feet along rail.

"The car used was an ordinary double-truck car of a type in common use upon the Montreal Street Railway system. It was operated for each test at speeds of 8 m.p.h. and 15 m.p.h. The track was a straight, level stretch of road newly constructed and with an even and fairly smooth finish of macadam especially between the rails. The rules for the award of points in the test were as follows:

"1. A complete pick-up or removal from the track by either the fender or wheelguard was to count four points.

"2. If any part of the dummy remained under or off the fender or wheelguard but it was partly picked up or removed from the track, three points.

"3. If the dummy was for the most part under or off the fender or wheelguard but still was partly picked up or removed from the track, two points.

"4. If the dummy was entirely under or off the fender or wheelguard but dragged sufficiently to prevent its going under the car or wheels, one point.

"5. If the dummy passed under the car or wheels the test would be considered a complete failure, counting no points.

"At the termination of the tests of the fenders it appeared to the commission that no one of them possessed sufficient merit to warrant its adoption in place of the wheelguard already approved and in use upon the lines of the Montreal Street Railway. This device is known as the H-B wheelguard. It had already been tested by the commission, but it was considered desirable that it should be subjected to much the same tests as the fenders above described had undergone. The H-B device was therefore tried with the two dummies weighing respectively 50 lb. and 170 lb. It is fair to note in respect to the tests applied to this wheelguard that the feet of the dummies had been broken off in previous trials, leaving the stubs merely. In a recumbent position, with feet toward the approaching car, the diameter of the stubs was not sufficient to operate the gate which hangs below the front of car and, by being thrust back automatically, releases a spring which brings the apron in the rear to the ground. It therefore occurred that before the larger part of the dummy came into contact with the gate the stubs were already below the apron. This would be practically impossible in the case of a living being. Even in this case the dummy was prevented from passing under the wheels or truck. The adverse feature of the H-B guard is that there is no protection to an upright body from contact with the front of car or the bumper. The main feature, however, in the opinion of the commission, is to prevent a person being dragged under the trucks or wheels, and in no case did this happen in the course of the tests applied. The absence of a low projecting apron is regarded by the commission as a commendable feature for the reasons that have been noted above and would itself justify the risk likely to occur from actual contact with the car. While therefore not expressing unqualified approval of the H-B wheelguard, the commission is of the opinion that as a safety and protective device it is upon the whole superior to any device which the commission has had an opportunity to examine thoroughly.

"The above observations are intended to apply particularly to streets of comparatively narrow width and somewhat congested traffic conditions such as very generally prevail in a city like Montreal."

The report contains tow tables, one showing the points gained and the other the percentage of marks obtained by the different devices. The H-B wheelguard was not in competition. In the table showing the percentage of marks obtained the remark is made that the H-B wheelguard was the only device to which no repairs were made.

General Safety Board Organized by Indiana Union Traction Company

A general safety board and five local safety committees have been organized among the officers and employees of the Indiana Union Traction Company, Anderson, Ind. The local safety committees meet once a month, and suggestions of a general nature are referred by these committees to the general safety board. H. A. Nicholl, general manager of the company, in a circular issued on May 24, 1912, said in part:

"While our company for several years has been holding frequent meetings of its department heads and subheads for the betterment of its service and the safety of its patrons and employees, a plan has been under consideration for some time whereby these matters of safety and betterment of service might receive the prominence subjects of such paramount importance deserve. On May 6, 1912, such a plan was formulated, and we take this occasion to place the details before you and to invite your hearty co-operation in our effort to make this property the safest and best operated in the country. We desire the slogan 'Safety first' to be the live wire of the property.

"There have been organized a general safety board and five local safety committees. The former consists of the general manager and heads of all departments who will meet as nearly as possible every two weeks. At five terminal points, namely, Anderson, Muncie, Marion, Tipton and Indianapolis, local safety committees have been appointed from the following classes of employees: Local superintendent, dispatcher, motorman, conductor, station agent, division engineer, section foreman, division electrician, power plant engineer, lineman, substation operator, shop foreman, car repairer, assistant claim agent, traveling auditor and traffic man. Each department is therefore represented at each point. The committeemen will serve for a period of six months.

"Meetings of the local safety committees will be held on the last Friday of each month. At these first meetings each committee will choose its secretary, and the chairman and secretary of each local committee will report in person to the general safety board at the next meeting of the board immediately following the meetings of the local safety committees.

"These committees have been organized for the purpose of considering matters relating to the safety and convenience of the company's patrons and employees, which necessarily includes the care of the company property. To obtain the results hoped for all employees must co-operate with each other and with the local safety committees.

"The make-up of a committee is such that it will furnish an avenue for any employee to make suggestions so that they will reach the whole committee. Each employee should make his suggestions to the committeeman with whom he is most closely in touch, but he need not confine his suggestions to matters pertaining only to his department, as we earnestly hope employees will make use of

every opportunity to bring all matters referring to safety to the attention of the local committees. If not personally in touch with a committeeman, please bring the matter to the committee's attention by letter, addressing same to its chairman, or dropping it in the 'suggestion box' located at your nearest terminal.

"We do not wish any instructions or orders interpreted as leaving 'Safety first' out of consideration; that is, it is desired that employees should not take any risks whatever. We want safety to be considered first, convenience and comfort of passengers second, and punctuality of trains third. The management wishes to extend all the help possible in the direction of safety, and you may count upon it to do everything it can.

"All local suggestions which members of the committees or employees can handle in the usual run of operation should be taken care of by the local committee or the man responsible. Suggestions of a general nature or of considerable importance should come to the attention of the general safety board, and any action which may be taken on these matters by the board will be reported to the local committee through which the suggestion originated, as well as to all others.

"Gold buttons will be given to the members of the general safety board and the chairman and secretary of each committee, silver buttons to all other members, and these buttons we wish worn as badges of honor and insignia of office.

"Full pay and traveling expenses will be allowed all employees members of any committee when attending meetings.

"We earnestly hope that each employee of the company will consider himself a committee of one to think, act and talk 'Safety first,' and that all will co-operate heartily in the work."

Reduction in Fare Ordered on New York State Line

The Public Service Commission of the Second District of New York has ordered the Rochester, Syracuse & Eastern Railroad to reduce its fare between Rochester and Stops 7 and 8 in Pittsford, Monroe County, from 15 cents to 10 cents. The order of the commission provides that the new fare shall become effective on June 17, 1912. The Rochester, Syracuse & Eastern Railroad operates over the tracks of the New York State Railways from the Four Corners, Rochester, to Culver Road. The distance from the center of Rochester to Stop 7 is 5.71 miles, and to Stop 8 the distance is 5.84 miles. Both stops are in what is termed by the railroad Fare Zone No. 2. Upon the mileage basis the rate of fare to Stop 7 is 2.62 cents per mile and to Stop 8 is 2.57 cents per mile. The average rate of fare between Rochester and Syracuse is 1.73 cents per mile.

In its opinion the commission says that the fundamental question is whether the charge of 15 cents fare from Stops 7 and 8 to Rochester is reasonable or unreasonable and whether it is discriminatory against the localities as compared with other localities. The opinion says:

"This question must be determined by a consideration of the distances involved, the rate per mile charged, the rate per mile generally charged in the vicinity of Rochester, as well as elsewhere, for suburban traffic, and the general level of the rates charged by the respondent itself. Taking into consideration these matters, the rate is unreasonable, excessive and discriminatory. Suburban rates generally are under 2 cents per mile. Suburban rates on other lines extending out of Rochester are in the neighborhood of 1.75 cents per mile. The respondent's own average local rate throughout its line is 1.94 cents per mile."

The traffic between Stops 7 and 8 in Rochester is very largely commuter travel, consisting of persons who have business in Rochester and children who attend school there.

Club Rooms for Duluth Employees.—The Duluth (Minn.) Street Railway is fitting up club rooms for its employees at its First Street carhouse at a cost of $3,000.

Proposal for Sprinkling Streets in Winnipeg.—The Winnipeg (Man.) Electric Railway has submitted a proposal to the City Council of Winnipeg to sprinkle the streets over which it operates in the city for $4,000 a year, the contract to run for three years.

Increase in Wages by Detroit, Monroe & Toledo Short Line Railway.—The Detroit, Monroe & Toledo Short Line Railway, owned by the Detroit (Mich.) United Railway, has voluntarily increased the wages of the men in its employ to correspond with the wages of the employees of the Detroit United Railway.

Short Strike on Massachusetts Road.—There was a short strike among the employees of the Warren, Brookfield & Spencer Street Railway, Brookfield, Mass., on June 5, 1912, caused by a misunderstanding in regard to the time of the payment of wages due to the men by the company. The property is now in the hands of T. T. Robinson as receiver.

Increase in Wages on Canadian Road.—The Berlin & Waterloo Street Railway, Berlin, Ont., has increased the wages of its motormen and conductors as follows: First six months, 16 cents per hour; second six months, 17 cents; second year, 17½ cents; third year, 19½ cents; fourth year, 20½ cents. The men will also be furnished with new uniforms.

Special Workmen's Tickets in New Brunswick.—The Public Utilities Commission of New Brunswick has directed the Moncton Tramways, Electricity & Gas Company, Moncton, N. B., to issue eight tickets for 25 cents on its lines in Moncton, to be good between 6:30 a. m. and 7:30 a. m., between noon and 1 p. m., and between 6 p. m. and 7 p. m.

Terms of Working Conditions Accepted by Connecticut Company Employees.—It was announced in New Haven, Conn., on June 8, 1912, that at a conference between representatives of the Connecticut Company and its motormen and conductors of all divisions, except New Haven, the wage scale and working conditions as fixed by the company had been accepted.

Owl Service Desired in Aurora, Ill.—The transportation committee of the City Council of Aurora, Ill., has decided to confer with E. C. Faber, general manager of the Aurora, Elgin & Chicago Railroad, in regard to the installation of owl service on the city lines in Aurora. The committee also desires to have the company begin service on Sunday at 7 a.m. instead of 8 a.m.

Chicago Elevated Transfer Ordinance.—The Chicago (Ill.) Elevated Railways has refused to issue universal transfers as ordered by the universal transfer ordinance passed by the City Council, as mentioned in the Electric Railway Journal of June 1, 1912, page 947. The elevated railway takes the position that the requirements of the ordinance are not legal, owing to the fact that the holding companies have not been merged.

Plans for Season at Glenwood Park.—The management of Glenwood Park, near New Albany, Ind., which is owned and operated by the Louisville & Northern Railway & Light Company and the Louisville & Southern Indiana Traction Company, has been put in the hands of Anderson G. Moore, commercial agent of these lines. The grounds have been leased to a company which will hold a Chautauqua at the park July 13-28. Many improvements have been made in the grounds.

Transportation Courtesies Extended to Officers and Crews of Visiting German Squadrons.—Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., arranged to have the Interborough Rapid Transit Company, the New York Railways and the New York & Queens County Railway issue special card passes to the visiting officers and men of the German squadron, giving them free transportation on these lines during their stay in New York Harbor from June 9 to June 13.

Improvements at Monarch Park.—The Citizens' Traction Company, Oil City, Pa., has opened Monarch Park for the season. Some attractive work has been done at the entrance to the park. A flower bed has been made in which more than 100 varities of lilies have been planted. A number of hardy flowering plants have been set out and grass has been sown on a portion of the grounds near the entrance, which was formerly bare. The miniature railroad has been removed. The company is said to be considering the installation of a roller coaster.

Plan for Adjustment of Working Terms in Springfield and Worcester, Mass.—An announcement has been issued in part as follows in regard to the plans which have been made for the adjustment of the questions affecting the relations of the New England Investment & Security Company and its employees in Springfield and Worcester, Mass.: "The company is to make an agreement with the organization representing the men and the clause in arbitration has been so reworded as to be mutually satisfactory. The question of wages is to be submitted to arbitration, the terms of that arbitration to be decided on later. This conference brings to a conclusion the discussions between employers and employees, which, while they have been lengthy, have been at all times perfectly amicable."

Fare Petition Requesting Change by International Railway.—The Trustees of La Salle, N. Y., have petitioned the Public Service Commission of the Second District of New York to require the International Traction Company, Buffalo, N. Y., to resume its former practice of selling transportation tickets at the rate of twenty tickets for $1 for fares between La Salle and Niagara Falls, the tickets to be transferable. The petition states that about a month ago the company discontinued the use of transferable tickets and that now the commutation books which are sold are good only to the person to whom the book is issued, and that this works great inconvenience to travelers, who are required to purchase several books in order to accommodate the different members of their families.

Suit to Restrain Sunday Operation.—Suit has been brought against the London & Lake Erie Railway & Transportation Company, London, Ont., under the railway act of the Province of Ontario, for $1,200 or an order to restrain the company from operating its railway on Sunday. The railway act, it is claimed, prohibits the operation of the railway on Sunday, except to keep the lines clear of ice or snow, the penalty for each violation to be $400. The company contends that the Province has no jurisdiction, as the line is run in conjunction with the Grand Trunk Railway and other railroads. It also contends that the railway act provides that the company shall not be liable, as the line connects ports on the lakes and gives continuous service between Canada and a foreign land. Judgment has been reserved.

Inspection of Newly Installed Signal System.—A. L. Neereamer, secretary of the Central Electric Railway Association; Alexander Shane, general manager of the Indianapolis, Columbus & Southern Traction Company; W. C. Phillips, superintendent of the Goshen, South Bend & Chicago Railroad, and C. J. Muntin, general superintendent of the Toledo & Chicago Interurban Railway, were the guests of C. L. Henry, president of the Indianapolis & Cincinnati Traction Company, on June 7, 1912, as members of a party which inspected the installation of the remotely controlled interlocking signal system designed by P. J. Simmen and installed by Northey-Plummer, Ltd., Toronto and Indianapolis, on the Indianapolis & Cincinnati Company's line, as described and illustrated in the ELECTRIC RAILWAY JOURNAL of June 8, 1912, page 968. It is intended shortly to make thorough tests on the Indianapolis installation of an automatic stop especially designed for use with the Simmen system.

My Lady Nicotine in Kansas City.—As the result of the ordinance passed by the City Council of Kansas City, Mo., to permit smoking on the three rear seats and platforms of the cars of the Metropolitan Street Railway during the summer months, service was interrupted on several lines of the company on June 11 and 12. The company announced that pending the result of the vote of its patrons in regard to smoking on the cars, taken by the company, smoking would not be permitted on the cars, and conductors and motormen were instructed to stop the cars on which patrons persisted in smoking. In consequence of this order there were many delays to traffic where passengers refused to stop smoking, and in some cases offenders were ejected by the other passengers. The commission government of Kansas City, Kan., in view of this controversy, has passed an ordinance to prohibit passengers from smoking on the cars in that city. It was expected that the result of the vote of the passengers in regard to smoking would be announced on June 13, 1912.

Personal Mention

Mr. L. G. White has resigned as general superintendent of the Columbus Railway & Light Company, Columbus, Ohio, to accept a position with the Public Service Commission of Ohio. Mr. White has been connected with the electric lighting and railway interests in Columbus for twenty years.

Mr. C. F. Berry, general manager and treasurer of the Portland (Me.) Railroad, has been appointed treasurer of the Cumberland County Power & Light Company, which controls the Portland Railroad. Mr. Berry has been connected with the Portland Railroad for thirty years. He was elected general manager and treasurer of the company about three years ago to succeed the late Edward A. Newman. Previous to that he had been Mr. Newman's assistant without title, but had chiefly to do with the accounting department.

Mr. Jack Abbott has been appointed superintendent of the Lafayette division of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., to succeed Mr. R. W. Levering, whose resignation to enter business for himself was noted in the ELECTRIC RAILWAY JOURNAL of May 25, 1912. Mr. Abbott was graduated from the University of Alabama and from Cornell and for a time was connected with the Rome Railway & Light Company, Rome, Ga. He afterward became superintendent of the Jackson Railway & Light Company, Jackson, Miss.

Mr. L. S. Storrs has been appointed a vice-president of the New York, New Haven & Hartford Railroad, with offices in New Haven, Conn. Mr. Storrs' especial assignment is to relieve the president in connection with the street railway and power systems controlled by the company, which include the Connecticut Company, New York & Stamford Railway, Westchester Street Railroad, Berkshire Street Railway, Rhode Island Company and the Housatonic Power Company. A biography of Mr. Storrs was published in the ELECTRIC RAILWAY JOURNAL of July 1, 1911.

Mr. E. T. Baker has been appointed auditor of the Coney Island & Brooklyn Railroad, Brooklyn, N. Y., to succeed Mr. Elmer M. White, whose appointment as auditor of the Americana Company was announced in the ELECTRIC RAILWAY JOURNAL of June 8, 1912. Mr. Baker is a native of Ohio. His first experience in business was in a bank in the town where he was born. He afterwards moved to Evansville, Ind., where he was chief clerk in the general freight office of the Evansville & Terre Haute Railroad. He was secretary, treasurer and manager of the Evansville Telephone Company, the Cumberland Telephone & Telegraph Company and the Great Southern Telephone & Telegraph Company, and following the sale of these properties he engaged with the Western Electric Company, of Chicago, Ill., as purchasing agent. Subsequently he became agent at Chicago for the Yost Writing Machine, and two years later he accepted the position of general manager of the Yost Writing Machine in New York. After this company was merged with other typewriter companies Mr. Baker served from 1895 to 1904 as chief accountant to the treasurer of Kings County and the city chamberlain of New York. He was next appointed auditor and comptroller of the Empire State Surety Company, New York, and in 1908 was appointed an accountant for the Public Service Commission for the First District of New York.

Mr. Harry B. Ivers, general manager of the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., has been appointed general manager of the Cumberland County Power & Light Company, which controls and operates the Portland Railroad, the Portland Electric Company, the Portland Lighting & Power Company and the Consolidated Electric Light Company. Mr. Ivers will continue as general manager of the Lewiston, Augusta & Waterville Street Railway, and will retain his residence in Lewiston for the present, but will spend three or four days of each week in Portland. Mr. Ivers has long been connected with street railway and lighting interests in New England. His experience dates from the spring of 1893, when he entered the employ of the Hyde Park Electric Light Company, of Hyde Park, Mass., under the management of Mr. Thomas

T. Robinson. During that year the Norfolk Suburban Street Railway was built, and during the two following years the West Roxbury & Roslindale Street Railway and the Norfolk Central Street Railway were built. These lines were also under Mr. Robinson's management, and Mr. Ivers was connected with the railways and the lighting company in different capacities in and about the power station and the carhouse and in the treasurer's office. The companies were later acquired by the Massachusetts Electric Companies, and Mr. Ivers assisted in consolidating the accounts and in operating the railways, which were organized as a division of the Old Colony Street Railway. Mr. Ivers subsequently acted as superintendent of what was known as the West Roxbury division of the Old Colony Street Railway; later he was transferred to Brockton in the interest of the consolidation and assisted in consolidating and systematizing the accounts of the separate companies in and surrounding Brockton. Later on he had his headquarters at Taunton, in the general superintendent's office, which developed to be the general office of the Old Colony Street Railway, after the consolidated properties had been divided into five divisions with only a division office in the places above mentioned. After being connected with these properties for nine years he was elected treasurer and manager of the Westerly Railway & Lighting Company, Westerly, R. I. After about four years' successful operation of these properties, he accepted the position of assistant to Mr. John R. Graham, president and general manager of the Bangor Railway & Electric Company, and a few months later was made treasurer of that company and of the Bar Harbor & Union River Power Company, which constructed the famous water-power plant upon the Union River at Ellsworth, Me. About a year thereafter Mr. Ivers was tendered the position of general manager of the Lewiston, Augusta & Waterville Street Railway, with headquarters at Lewiston.

OBITUARY

Dr. Paul Micke, director of the Grosse Berliner Strassenbahn, Berlin, Germany, died on May 15. Dr. Micke was born on Oct. 13, 1844, at Breslau, and entered the government railway service in 1871. From 1879 to 1898 he was in the department of public works in various capacities. The electrification of the Berlin Street Railway occurred shortly after Dr. Micke became director of the company. In addition to his railway work, Dr. Micke was a member of the executive committee of the Physical Society and the Electrotechnical Society. His private laboratory was one of the finest in Germany. Dr. Micke had been president of the German Street & Interurban Railway Association since 1903. His interest in American electric railway developments was manifested by a visit made by him to this country several years ago.

William Northrop, president of the Virginia Railway & Power Company, Richmond, Va., died suddenly of heart failure on June 11, 1912, at his home near Forest Hill. Mr. Northrop was born in Pennsylvania forty-three years ago. He was educated at Philadelphia and at the University of New York, where he took the course in civil engineering. Shortly after he was graduated Mr. Northrop accepted a position with the Philadelphia & Reading Railroad. In 1897 he led an expedition into the interior of Alaska. In 1902 he engaged in ranching in Montana. The Richmond Passenger & Power Company and the Richmond Traction Company were consolidated early in 1902, and the control of the consolidated properties passed in December, 1902, to the Gould interests. In the month following Mr. Northrop was appointed assistant secretary and assistant treasurer of the company and continued in this capacity until 1904, when he and Henry T. Wickham were appointed receivers of the company. On July 1, 1909, the Virginia Railway & Power Company was organized to succeed the Richmond Passenger & Power Company and Mr. Northrop was elected president of the company. Besides being president of the Virginia Railway & Power Company, Mr. Northrop was president of the Norfolk Railway & Light Company, the City Gas Company of Norfolk, vice-president of the Richmond & Chesapeake Bay Railroad Company, and president of the Fredericksburg Electric Company. He was a member of the Chamber of Commerce and a director of the National Bank of Virginia. He is survived by a widow.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Indianapolis, New Castle & Eastern Traction Company, Indianapolis, Ind.**—Incorporated in Indiana to succeed the Indianapolis, New Castle & Toledo Railway, the property of which was sold under foreclosure recently. Capital stock, $1,000,000. Incorporators: John P. Todd, Frank Thompson, Frederick A. Likely, William Winter and B. Q. Hendricks.

Independence, Neodesha & Topeka Railway, Independence, Kan.—Chartered in Kansas to build an electric railway from Independence to Neodesha, Altoona, Fredonia and Topeka. Capital stock, $50,000. Incorporators: T. Blakeslee, A. F. Squires and J. W. Sutherland, Neodesha; William Nees, W. A. Spencer, H. E. West, J. T. Wright and Thomas J. Booth, Independence; John S. Hubbel, Fredonia; A. L. Scott, Syracuse, and Charles N. Converse, Altoona. [E. R. J., June 1, '12.]

***Trolley Terminal Company, Oswego, N. Y.**—Incorporated by business men of Oswego to provide a terminal station for the Syracuse, Lake Shore & Northern Railroad, which will be leased by the company for a term of years. The Terminal Company will have no connection other than with this railroad. F. E. Sweetland, chairman of committee.

***Sioux City, Mitchell & Pierre Railway, Pierre, S. D.**—Application for a charter has been made in South Dakota by this company to build an interurban railway between Mitchell and Pierre. Capital stock, $3,000,000.

***Houston-Northern Railway, Houston, Tex.**—Chartered in Delaware to build a 242-mile electric railway from Houston to Texarkana, Tex. The Indianapolis Construction Company, 421 Hume Mansur Building, Indianapolis, Ind., has the contract to construct and equip this line and will proceed to make the necessary commercial report, location surveys, and to secure rights-of-way and franchises. It is understood that the engineering work on this line will be handled by H. U. Wallace & Company, engineers, of Chicago, for the Indianapolis Construction Company. John Lovejoy and associates, of Houston, are interested.

FRANCHISES

Pacific Grove, Cal.—The Monterey & Pacific Grove Railway has asked the Trustees for a franchise for a double-track line along Central Avenue and Lighthouse Avenue to the Southern Pacific depot in Pacific Grove.

San Bernardino, Cal.—The Pacific Electric Railway has received a franchise on Rialto Avenue in San Bernardino from the Council. The company has asked the Council for a franchise to extend its lines in Los Angeles.

East Lyme, Conn.—The New London & East Lyme Street Railway has asked the Public Utilities Commission to approve an extension in East Lyme.

***New Castle, Del.**—The Wilmington, New Castle & Delaware City Railway has asked for a franchise in New Castle.

New Augustine, Fla.—The St. John's Light & Power Company has again asked the County Commissioners for a franchise to extend its line to and through New Augustine.

Iowa City, Ia.—The Davenport & Suburban Railway has received a franchise from the Council in Iowa City.

Mount Vernon, Ia.—The Cedar Rapids & Iowa City Railway & Light Company has received a franchise from the Council in Mount Vernon.

Muscatine, Ia.—The Davenport & Muscatine Street Railway has received a twenty-five-year franchise in Muscatine.

Topeka, Kan.—The Kansas Central Traction Company has asked the Utilities Commission for permission to build an electric railway from Parsons to Coffeyville and Galena. Phillip Strack, Indianapolis. [E. R. J., June 1, '12.]

Gretna, La.—Leo A. Marrero has bought a ninety-nine-year franchise from the Council for an electric railway from Gretna to Waggaman. [E. R. J., June 3, '11.]

Brookline, Mass.—The Boston Elevated Railway has been granted permission to relocate its tracks on Boylston Street and Cypress Street to the carhouse at Franklin Street, Brookline.

Worcester, Mass.—The Providence & Worcester Street Railway has asked the Council for an extension of its franchises from July 7, 1912, to Jan. 7, 1914, to build the Millbury-Worcester line to Portland Street.

Bethany, Neb.—The Bethany Traction Company has received a franchise from the County Commissioners for a line on Holdrege Street, from the east corporate limits of University Place to the west limits of Bethany Heights. C. W. Jester, president. [E. R. J., June 1, '12.]

Jamaica, N. Y.—The Manhattan & Jamaica Railway, Patchogue, has been granted permission by the Board of Estimate of New York to take over the franchise for an electric railway from Queensboro Bridge to Jamaica and the Nassau County line held by the South Shore Traction Company. The Manhattan & Jamaica Railway has agreed to the insertion in the grant of a non-exclusive clause. The incorporation of the Manhattan & Jamaica Railway to succeed the South Shore Traction Company was noted in the ELECTRIC RAILWAY JOURNAL of May 4, 1912.

Columbus, Ohio.—The Fifth Avenue Railway & Light Company has received a twenty-five-year franchise from the Council for a crosstown line in Fifth Avenue from the Sunbury Pike, near St. Mary of the Springs, to Arlington Avenue, Marble Cliff.

Fort William, Ont.—The Mount McKay & Kakadeka Falls Railway has submitted a proposition to the Fort William (Ont.) Council for a franchise over the street railway in Fort William. The Ontario Legislature has extended the time within which this company may complete its projected lines and authorized an increase of capital stock from $250,000 to $500,000.

Pittsburgh, Pa.—The Frankstown Avenue Extension Street Railway has received a twenty-five-year franchise from the Council on Frankstown Avenue within the city limits of Pittsburgh.

Richmond, Va.—The Richmond & Henrico Railway has asked the Common Council for franchises to extend its lines in Richmond.

Wausau, Wis.—The Wausau Street Railway has asked the Council for a franchise to extend its lines in the north end of Wausau. This is believed to be the last link in the completion of a right-of-way for an interurban line from Wausau to Merrill, a distance of 20 miles.

TRACK AND ROADWAY

Birmingham & Chattanooga Railroad, Birmingham, Ala.—This company will begin construction within the next six months on its 145-mile line to connect Birmingham, Boaz and Chattanooga. It has not yet been decided whether the motive power will be steam or electricity. Capital stock authorized, $5,000; issued, $5,000. Officers: J. M. Spradin, Boaz, president and treasurer; W. W. Shortridge, vice-president and secretary. [E. R. J., Dec. 9, '12.]

***Redwood City, Cal.**—H. C. Tuschen, Redwood City; William H. Brown, San Mateo; G. J. McGregor, Burlingame; D. G. Doubleday, Millbrae, and William J. Martin, South San Francisco, are considering plans for the construction of an electric railway between San Francisco and South Peninsula points.

Columbus (Ga.) Electric Railway.—Work will soon be begun by this company rebuilding its Rose Hill line from Nineteenth Street to the end in Columbus.

Nampa & Caldwell Electric Railway, Nampa, Idaho.—This company placed in operation on June 2 its 9-mile electric railway between Nampa and Caldwell. C. W. Van Kirk, Caldwell, is interested. [E. R. J., Dec. 13, '12.]

***Portland-Marion Interurban Railway, Hartford City, Ind.**—This company has been formed to build an electric railway to connect Portland and Marion, a distance of 46 miles. A. E. Townsend and William Binns are interested.

Cedar Rapids & Iowa City Railway & Light Company, Cedar Rapids, Ia.—Contracts for grading along the right-of-way between Cedar Rapids and Mount Vernon will be let at once by this company.

Tri-City Railway & Light Company, Davenport, Ia.—This company made a test run over its new line between Davenport and Muscatine on May 22. Owing to the fact that a crossing in a branch of the Chicago, Rock Island & Pacific Railroad had not been installed near Muscatine it was impossible to run into Muscatine. The work of ballasting the new line is progressing rapidly, and as soon as this can be completed the road will be opened for regular service. Six passenger coaches and one freight car which were ordered from the Ellis Car Company are now being delivered, so that everything will be ready for service as soon as the ballasting is completed.

Oskaloosa Traction & Light Company, Oskaloosa, Ia.—This company will place contracts during the next few weeks to build 1 mile of new track to the Country Club.

Kentucky Southwestern Railway, Light & Power Company, Hickman, Ky.—The final location work on this company's line has been begun out of Paducah by W. H. Calhoun. Most of the right-of-way has been secured. [E. R. J., March 9, '12.]

Louisville (Ky.) Railway.—The Cane Run Road Improvement Club has asked the company to extend its Greenwood Avenue line out Cane Run Road, a distance of 12 miles. No statement has been made by the company as to whether the extension will be undertaken.

Shelbyville, Ky.—Surveys have been completed and right-of-way is being secured for a line between Shelbyville and Frankfort. W. J. Lindsay, Cleveland, is interested. [E. R. J., June 8, '12.]

Boston (Mass.) Elevated Railway.—It is reported that this company will extend its line from Watertown Square to Bemis station. A franchise will soon be asked of the Councils.

Boston & Western Electric Railway, Boston, Mass.—The Railroad Commission has issued an order establishing the route of this company in Waltham, Marlboro, Wayland, Weston, Sudbury and Maynard.

Worcester (Mass.) Consolidated Street Railway.—This company has been asked to consider plans to extend its line from Clinton to Ayer and from Ayer to Nashua, N. H., thereby making a direct route from Springfield to Concord, N. H.

Albion, Brookfield & Charlotte Railroad, Jackson, Mich.—This railway will be constructed this summer by a new company, which has purchased the title to the bonds issued some years ago to the amount of $250,000 for a line to extend from Albion to Charlotte, the roadbed for which was graded to within 2 miles of the latter place and then abandoned. Work on the new line will proceed at once. Gasoline motor cars will be used for passengers and steam for freight. Officers: L. C. Davis, Chicago, president; A. E. Ellerthorpe, Jackson, vice-president and treasurer, and C. H. White, secretary. [E. R. J., Jan. 1, '12.]

Saginaw-Bay City Railway, Saginaw, Mich.—This company has been asked to extend its line on Farragut Street, south of Columbus, to Twenty-sixth Street in Bay City.

***Wells, Minn.**—Basil Smout has been elected chairman of a committee to raise funds for the proposed electric line through Wells. The line will come into Wells and run along Main Street and 1 mile east, and will branch out, one line going through Waldorf and then on to Faribault.

Ellisville, Miss.—Work will be begun at once on the electric railway to connect Ellisville, Laurel, Hattiesburg and Moselle. Surveys have been completed. Guy M. Walker is interested. [E. R. J., April 22, '12.]

Roundup (Mont.) Interurban Railway.—This company will begin construction within the next few weeks on its 5-mile gasoline railway between Roundup and Klein. Franchises over the county roads have been secured. Capital stock authorized, $100,000. Officers: J. W. Newton, president; Augustus Schrump, vice-president; E. E. Congdon, secretary; M. M. Klein, treasurer, and M. H. Wall, general manager, all of Roundup. [E. R. J., June 1, '12.]

St. John (N. B.) Railway.—The New Brunswick Legislature has authorized this company to extend its railway to points outside of St. John. Including its share of the cost of the new bridge at Reversing Falls, the company has arranged to spend $250,000 upon improvements this year.

Concord, N. H.—The Concord & Montreal Railroad has decided to build an electric railway from Fabyans to the summit of Mount Washington and to issue $1,500,000 of new stock to finance the project. [E. R. J., May 4, '12, page 767.]

Atlantic Suburban Railway, Pleasantville, N. J.—This company has placed a contract with the Nelson-Merydith Company for the rebuilding of a bridge over Beach Thoroughfare, Atlantic City. The cost is estimated to be about $30,000.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—This company has placed a contract for the construction of 1 mile of double track in Olean.

Ottawa & St. Lawrence Electric Railway, Ottawa, Ont.—This company will begin construction about the first of July on its 274-mile gas-electric railway from Ottawa to Morrisburg. At Morrisburg one branch will run to Cornwall and another to Prescott, Athens, Toledo, Perth, Brightside, Brayside and Britannia. Capital stock authorized, $4,000,000; bonds authorized, $20,000. [E. R. J., Jan. 8, '10.]

***Port Arthur, Ont.**—Plans are being considered for the construction of a 7-mile electric belt railway to connect with the main line and the Arthur Street extension in Port Arthur.

St. Thomas (Ont.) Street Railway.—Two by-laws were voted on and approved in St. Thomas, Ont., on May 13, one for the extension of the railway lines and the second for betterments of the existing lines. The first provided for building a cross-over at William Street and to extend the Ross Street line to Wenlock Street, and the second provided for spending $23,500 in overhauling the present lines.

Dunnville, Wellandport & Beamsville Electric Railway, Wellandport, Ont.—This company has received permission by the Dominion Board of Railway Commissioners to construct crossings on the level across the Grand Trunk Railway and the Canada Southern Railway, near Moulton, Ont.

Portland, Eugene & Eastern Railway, Portland, Ore.—Construction has been begun by this company in Corvallis. This line will extend from Eugene to Corvallis.

Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa.—This company expects to rebuild, in conjunction with the Commissioners of Bucks County, a bridge over the Neshaminy Creek near Croydon. In conjunction with the Lehigh Canal Company it is now rebuilding a bridge over the canal at Mill Street, Bristol.

Slippery Rock & Grove City Railway, Grove City, Pa.—This company plans to resume the construction of its line between Slippery Rock and Grove City.

South Fork-Portage Railway, Johnstown, Pa.—This company advises that during the next three weeks a contract will be placed by the Portage Construction Company, which has the contract to build 7½ miles of new track, for material for the construction of the line. Four steel bridges will be built.

Lancaster & York Furnace Street Railway, Millersville, Pa.—During the next few weeks this company will award contracts to reballast 10 miles of roadbed and realign track.

People's Street Railway, Nanticoke, Pa.—This company will soon place contracts to build 5284 ft. of track, using a 7-in. or 8-in. 80-lb. high T-rail.

Montgomery Transit Company, Norristown, Pa.—This company is now building a 4½-mile extension of its railway from Skippack to Harleysville.

Philadelphia & West Chester Traction Company, Upper Darby, Pa.—Work was begun on the extension of this company's line from Drexel Hill to Media. The contract for grading and masonry has been awarded to Patricius McManus, Philadelphia. The new line will be built entirely upon private right-of-way, except within the limits of Media, where it passes through the main business thoroughfare of the town.

***Montreal, Que.**—Negotiations are in progress between the Montreal Tramways and the Canadian Northern Railway interests for the construction of an electric railway in the new suburb being laid out by the railway company at the back of Mount Royal.

Moose Jaw (Sask.) Electric Railway.—This company has purchased a site of 25 acres for park purposes on the river about 2 miles from the post office at Moose Jaw, Sask. Track is to be laid to the park at the earliest possible date.

***Saskatoon, Sask.**—The Municipal Council of Saskatoon has decided to present a by-law calling for the construction of an electric railway to the ratepayers for decision. The Stone & Webster Engineering Corporation has made an offer to construct the line and finance the same for the period of twelve months in exchange for civic bonds to the value of $500,000.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company intends to build an extension from Chamberlain Street to Vance Avenue, to be used in connection with the Oak Street line. The company has completed its line to Mission Ridge and plans to construct a line from Mission Ridge to Lookout Mountain.

Chattanooga, Rome & Atlanta Railway, Chattanooga, Tenn.—Right-of-way has been secured by this company through Rossville and to the top of Missionary Ridge, and construction will be begun as soon as the right-of-way between the summit of the ridge and Chickamauga Park is secured. S. W. Divine, secretary. [E. R. J., April 27, '12.]

Elizabethton, Milligan & Johnson City Electric Railway, Johnson City, Tenn.—Most of the right-of-way has been obtained by this company for its 10-mile electric railway between Johnson City and Elizabethton, via Milligan College. J. C. Burchfield, Elizabethton, president. [E. R. J., June 10, '11.]

Lake View Traction Company, Memphis, Tenn.—Interest has been revived in this company and plans are being considered to finance and build its line in the near future.

Dallas (Tex.) Consolidated Street Railway.—This company will double-track its Bryan Street line from Cantegral as far east as the Ursuline convent on St. Joseph Street in Dallas.

Fort Worth, Mineral Wells & Northwestern Railway, Fort Worth, Tex.—Announcement has been made that this company will be financed by the Mercantile Trust Company, St. Louis, headed by Festus J. Wade. This 70-mile electric railway will connect Fort Worth and Mineral Wells. [E. R. J., April 6, '12.]

Rutland Railway, Light & Power Company, Rutland, Vt.—This company plans to expend $1,000,000 for improvements to its lines in the near future. Among the improvements will be an extension from Poultney to Granville. Engineers are now surveying the proposed route.

Virginia Railway & Power Company, Richmond, Va.—Arrangements are being made by this company to extend its Halifax Street line for some distance in Richmond.

Grafton (W. Va.) Traction Company.—This company has placed in operation its 2-mile extension in Grafton to Grafton Park.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company has received permission to build an extension in Milwaukee into the fair grounds and erect a terminal at the west gate.

SHOPS AND BUILDINGS

Lethbridge (Alta.) Municipal Tramway.—The City Council has let a contract to the Wisconsin Steel & Iron Works for the erection of carhouses for this railway now under construction. [E. R. J., April 27, '12.]

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company has purchased from George McNear a tract of land in East Petaluma which has been occupied by the company for a passenger and freight depot, carhouses and railroad yards.

Pacific Electric Railway, Los Angeles, Cal.—Plans are being considered by this company to build new carhouses in Riverside.

Illinois Traction System, Peoria, Ill.—This company has purchased a site on Hamilton Street and South Jefferson Avenue, Peoria, for $68,800 for the erection of a passenger station and office building.

St. Joseph Valley Traction Company, Elkhart, Ind.—This company plans to build in the near future a new passenger and freight depot. It will be one-story, 40 ft. x 70 ft.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—Contracts will be awarded soon by this company for the construction of its new carhouse on the property bounded by St. Clair, Oriental and North Streets and Highland Avenue, in Indianapolis. The cost will be about $150,000. [E. R. J., March 30, '12.]

Springfield & Central Illinois Traction Company, Terre Haute, Ind.—This company will use the Terre Haute, Indianapolis & Eastern Traction Company's new terminal station but will build a freight station to take care of the shipping trade in Terre Haute. I. A. Smith, president.

Detroit (Mich.) United Railway.—Plans are being made by this company for the development of its property in Highland Park. Repair shops and other buildings are to be erected. The first of these buildings to be built will be a paint shop, and plans for this structure are now being prepared by Smith, Hinchman & Graylis, as referred to at length elsewhere in this issue.

United Railways, St. Louis, Mo.—This company has purchased part of the block bounded by Eichelberger and Walsh Streets and Michigan and Compton Avenues in St. Louis, on which it expects to build new carhouses for the storage of the Bellefontaine and Grand cars.

South Fork-Portage Railway, Johnstown, Pa.—This company plans to build soon a new temporary carhouse in Johnstown. The Portage Construction Company has the contract.

Montgomery Transit Company, Norristown, Pa.—During the next few weeks this company expects to award contracts to build a new carhouse and repair shop.

Sioux Falls (S. D.) Traction Company.—Plans are being made by this company to build a carhouse in Sioux Falls.

POWER HOUSES AND SUBSTATIONS

Cairo Railway & Light Company, Cairo, Ill.—Plans are being made by this company for the construction of an addition to its power house. The structure will be 68 ft. x 100 ft. and of brick construction.

Aroostook Valley Railroad, Presque Island, Maine.—During the next three weeks this company will award contracts to build a new substation at Caribou.

Marquette County Gas & Electric Company, Ishpeming, Mich.—This company plans to install new equipment at its power house soon.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—During the next few weeks this company will award contracts to build two substations and 30 miles of 60,000-volt transmission line in Buffalo. This company has purchased three 500-volt rotary converters with step-down transformers and switchboard equipment, etc.

New York State Railways, Rochester, N. Y.—This company is building a new substation at Rochester, which will supply power for the Charlotte and Summerville lines.

Ohio Traction Company, Cincinnati, Ohio.—This company will increase the capacity of its East End power house in Cincinnati, convert its generating stations at Hunt Street and Cumminsville into substations and furnish all power hereafter from the East End and Eighth Street power houses.

Mahoning & Shenango Railway and Light Company, Youngstown, Ohio.—Work has been begun on this company's new power house at Lowellville by Stone & Webster, Boston, Mass.

Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa.—This company has just completed the addition to its power station at Croyden, which is to contain a Hamilton-Corliss cross-compound condenser engine and 400-kw Western Electric generator.

South Fork-Portage Railway, Johnstown, Pa.—This company plans to build soon a new temporary substation, which will have one 300-kw rotary converter with transformers. The Portage Construction Company has the contract for the construction.

Kittanning & Leechburg Railways, Kittanning, Pa.—An addition is to be built to the power house in Garret's Run of this company. It is to be of concrete and brick. The plans have been drawn but the contract has not been let.

Manufactures and Supplies

ROLLING STOCK

Shreveport (La.) Traction Company has ordered five cars from the American Car Company.

Montgomery (Pa.) Transit Company has ordered a freight car from the Russell Car & Snow Plow Company.

Saginaw Valley Traction Company, Saginaw, Mich., has ordered one 28-ft. pay-as-you-enter car body from the G. C. Kuhlman Car Company.

Richmond & Rappahannock River Railroad, Richmond, Va., has ordered one 34-ft. 1⅜-in. semi-convertible near-side motor body from The J. G. Brill Company.

Milville (N. J.) Traction Company has ordered one 31-ft. 8-in. closed semi-convertible combination passenger-smoking car mounted on Brill 27-E-1 trucks from The J. G. Brill Company.

Indiana Union Traction Company, Anderson, Ind., reported in the ELECTRIC RAILWAY JOURNAL of April 13, 1912, as having prepared specifications for ten all-steel interurban cars, has ordered these cars from the Cincinnati Car Company.

South Fork-Portage Railway, Johnstown, Pa., will place an order during the next three weeks, through the Portage Construction Company, for two 44-ft. cars complete with double trucks, four 75-hp motors for 1200-volt d.c. operation on trolley, air brakes, etc.

TRADE NOTES

Consolidated Car Heating Company, Albany, N. Y., has elected Frederick W. Kelly president of the company to succeed C. S. Hawley.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., has opened an office at 204 White Building, Seattle, Wash., in charge of C. A. Perkins, district manager.

Barney & Smith Car Company, Dayton, Ohio, has elected H. M. Estabrook president of the company to succeed A. M. Kittredge, resigned. Mr. Estabrook was vice-president of the company.

Heywood Brothers & Wakefield Company, Wakefield, Mass., has placed Scot Wade in charge of the car seat department of the Chicago office with headquarters at 1415 Michigan Avenue, Chicago.

St. Louis Surfacer & Paint Company, St. Louis, Mo., has appointed James Paton its sales representative. Mr. Paton recently resigned from the sales organization of the National Brake & Electric Company, which he represented in St. Louis for some time.

Canton Culvert Company, Canton, Ohio, reports the sale of a single order of 11,000 ft. of Acme (nestable) corrugated No-Co-Ro metal culverts to a Southern railroad, this being the third or fourth large order to have been received from the same company within the past year.

Burton W. Mudge & Company, Chicago, Ill., have appointed Robert M. Smith their sales manager. Mr. Smith goes to Chicago from New York, where he has for several years been in charge of the railroad department in Eastern territory for a supply company.

Duff Mfg. Company, Pittsburgh, Pa., manufacturer of Barrett lifting jacks, has purchased five acres of ground on Preble Avenue, Northside, Pittsburgh, on the lines of the Pennsylvania and Baltimore & Ohio railroads, on which it will erect a new factory. Work on the factory and office buildings will commence about July 1.

M-C-B Company, Chicago, Ill., has been organized to manufacture and deal in railway supplies, with Walter E. Marvel, formerly of the Detroit Seamless Steel Tubes Company, as president. It will have offices at 1334 McCormick Building, Chicago. The Russell Car & Snow Plow Company has appointed the M-C-B Company its exclusive agent in Western territory.

H. W. Johns-Manville Company, New York, N. Y., has appointed S. C. Meek assistant general manager of the electrical department of the company. Mr. Meek has been associated with the company as special representative in the electrical department for more than fifteen years. He will have his headquarters at the New York office.

Pay-As-You-Enter Car Corporation, New York, N. Y., has received contracts for construction rights for prepayment cars from the following companies:: Detroit (Mich.) United Railways, 100 cars; United Railways & Electric Company, Baltimore, Md., sixty cars; Capital Traction Company, Washington, D. C., twenty-five cars; Schenectady Railway, Citizens' Traction Company, Oil City, Pa., and the Augusta & Aiken Railway & Electric Company, Augusta, Ga.

The J. G. Brill Company, Philadelphia, Pa. has received orders for trucks from the following companies: Southern Traction Company, Waco, Tex., eight Brill 39-E trucks and eight Brill 57-D trucks; Denver (Col.) City Tramway, forty Brill 39-E trucks without center bearings; Geary Street Municipal Railway, through W. L. Holman Company, ninety Brill 27-GE-1 trucks; Chattanooga Railway & Light Company, Chattanooga, Tenn., through Cincinnati Car Company, twenty Brill No. 22 special trucks; Grand Rapids (Mich.) Railway, through Cincinnati Car Company, twenty Brill 27-G-1 trucks.

Westinghouse Electric & Manufacturing Company, New York, N. Y., has received orders for railway motors from the following companies: Havana Electric Railway, Havana, Cuba, thirty double equipments of No. 323-A motors; Montgomery Transit Company, Norristown, Pa., one quadruple equipment of 101-B-2 motors and K-28-B control; Susquehanna Railway, Light & Power Company, New York, N. Y., eighteen quadruple equipments of 101-B-2 motors and K-28-B control; Union Street Railway, New Bedford, Mass., two quadruple equipments of 101-BA motors with K-35-M control; Springfield (Mass.) Street Railway, one double equipment of No. 305-A-2 motors and HL control, and one quadruple equipment of No. 323 motors and HL control; Erie Railroad Company, two quadruple equipments of No. 132-A motors and HB control.

General Electric Company, Schenectady, N. Y., has received the following orders for railway motor equipments: Bucks County Electric Railway, Newton, Pa,, one GE-81 30-hp four-motor car equipment; Iowa City (Ia.) Electric Railway, two GE-54-A 25-hp motors; San Diego (Cal.) Electric Railway, four GE-203-A 50-hp motors and two K-35 controllers; Eastern Pennsylvania Railways, Pottsville, Pa., four GE-90-A 50-hp four-motor car equipments; El Paso (Tex.) Electric Railway, twenty-eight GE-80-A 40-hp motors and rheostats; Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis., one GE-74 65-hp four-motor car equipment; Beech Grove (Ind.) Traction Company, one GE-203 50-hp two-motor car equipment; Illinois Central Electric Railway, Canton, Ill., two GE-210 70-hp four-motor equipments and two variable release automatic air-brake equipments with CP-27 compressors; Virginia Railway & Power Company, Richmond, Va., three emergency and five straight air-brake equipments with CP-27 compressors; Manchester Street Railway, Manchester, N. H., six GE-203 50-hp motors; Indiana Union Traction Company, Anderson, Ind., three 200-kw transformers and switchboard; Laurel Light & Railway Company, Laurel, Miss., four GE-80 40-hp two-motor car equipments; Northern Texas Traction Company, Fort Worth, Tex.. four GE-73 75-hp four-motor car equipments and two additonal GE-73 motors; Chattanooga Railway & Light Company, Chattanooga, Tenn., ten GE-210 70-hp two-motor car equipments complete with controllers and ten straight air-brake equipments with CP-27 compressors.

ADVERTISING LITERATURE

Indestructible Sign Company, Columbus, Ohio, is mailing a card which calls attention to the solid steel plate signs which it manufactures.

Lea Equipment Company, Philadelphia, Pa., has issued Bulletin No. 8, entitled "The Science of Cutting Metals Cold," in which the Lea-Simplex cold saw is fully described and illustrated.

U. S. Gutta Percha Paint Company, Providence, R. I., has issued two booklets describing Rice's mill white paint. This paint is used for interiors of carhouses, power plants, substations, waiting rooms, etc.

Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany, has just issued two bulletins, No. 8, which illustrates a safety device for the protection of electric braking equipment, and No. 9, which illustrates its latest types of trolley cars.

Niles Car & Manufacturing Company, Niles, Ohio, has issued a loose-leaf catalog which describes and illustrates twenty-four cars of various types manufactured by the company. The catalog also contains thirty-six illustrations and diagrams of Niles cars now in operation.

Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a thirty-two-page catalog on Hess-Bright ball-bearing hangers. The many advantages of H-B ball bearings on line shaftings are discussed. The catalog contains numerous illustrations showing H-B hangers in use in shops all over the country.

International Oxygen Company, New York, N. Y., has issued five bulletins on the following subjects: "High-Pressure Cylinders," "I. O. C. Oxy-Hydrogen Platinum Melting Process," "Welding Torches," "Generating Acetylene Gas," "Oxy-Hydrogen and Street Railway Construction." Bulletin No. 7 contains practical hints and data for users of oxygen apparatus.

W. N. Matthews & Brother, St. Louis, Mo., have issued Catalog No. 8, which covers the entire line of Matthews specialties. The various devices manufactured by the company are fully described and illustrated in the first half of the catalog. The remainder contains useful data, consisting of formulas, tables and diagrams of interest to electrical engineers engaged in construction work.

Nelson Valve Company, Philadelphia, Pa., has issued Catalog S, which describes and illustrates its entire line of steel valves and steel fittings. These include gate valves, globe valves, angle valves, vertical valves, cushioned non-return stop valves, cushioned non-return valves, check valves, throttle valves and blow-off valves. Valves are shown for superheated steam, as well as for high-pressure saturated steam and for severe hydraulic work.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 4938, which is devoted to its type H transformers. Bulletin No. 4910 is devoted to oil-break switches for 600-volt, 4500-volt and 7500-volt alternating-current circuits. This is known as the type F, form K-5 switch. The bulletin enters into the details of construction and contains dimensions and connection diagrams. Bulletin No. 4949 is devoted to direct-current portable instruments, type DP-2, which are designed for laboratory and general testing purposes.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued the following descriptive leaflets: No. 2303 describes direct-current crane motors; No. 2464 describes type HD rheostats for d.c. motors; No. 2377 describes box-frame interpole railway motor No. 308 B-2 for locomotive work; No. 2376 describes box-frame interpole railway motor No. 321 for use on 600-1200-volt service; No. 2370 covers various details of railway motors such as bearings, brush holders, commutators, field coils, etc.; No. 2368 describes strap-wound armature coils of Westinghouse railway motors (this leaflet contains a reprint from the Electric Railway Journal on the subject of "Square Wire or Strap Copper Construction"); No. 2444 describes equalizer flywheel hoisting sets; No. 2393 covers Westinghouse dynamotor compressor for 1200-1500 volt direct-current service; No. 2496 describes outdoor-type, oil-insulated self-cooling transformers.

The Appellate Division of the State Supreme Court has handed down a decision on appeal in the suit of the Brooklyn Heights Railroad against the Brooklyn City Railroad for expenditures incurred in electrifying the latter system prior to 1894. The referee in the original suit, D-Cady Herrick, filed a report on Feb. 25, 1910, awarding the Brooklyn Heights Railroad $3,356,938, of which $1,740,258 was principal and $1,616,680 interest due from Sept. 1, 1894. The decision of the Appellate Division in brief is that the Brooklyn Heights Railroad is entitled to the principal of its claim of $1,740,258, on which interest may be charged from the date of the referee's finding. According to the decision "the judgment must be modified by deducting therefrom the interest undecided therein and, as so modified, affirmed without cost to either party in this court."